

KHLERNIKOV, A. Ye

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LEONIDOV, N. K.

25(5) PRAVE I MOSE KRYLOVICH 807/1997

Leningradskiy mekhanicheskiy i tekhnicheskii institut

Metallurgiya stali, 1967-1977, t. 1. (Metallurgy of the USSR, 1967 - 1977, Vol. 1) Moscow, Metallurgizdat, 1978. 745 p. 5,000 copies printed.

M. (Title page): V. P. Buzin, A. K. Khlernikov; M. (Inside book): G. V. Popov; Dokl. M. I. G. O. Khmer.

PURPOSE: The book is intended for scientific workers and engineers in metallurgical plants and in the machine-building industry. It may also be used by students in advanced courses in metallurgical vases.

CONTENT: This collection of articles covers intensively practical and theoretical developments in Soviet metallurgy during the last 40 years. The material deals with the discovery and development of the major ore deposits and the growth of the metal industry in various parts of European and Asiatic USSR. Research institutes, laboratories, their location, and the names of the scientists and engineers involved are listed. Many papers contain so many references and names of various personalities that it was considered beyond the scope of the scope of various articles to list them. The authors claim that the processes, methods and theories described in this book reflect the most recent developments in Soviet metallurgy.

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Metallurgy of the USSR (Cont.)

807/1997

met. A marked increase in the production of alloyed steel is scheduled for 1960. The development of automated processes in foundries is accelerated. There are 4 Soviet references.

Khlernikov, A. Ye. The Development of Open Hearth Technology in the USSR. In: Metallurgy of the USSR, 1967-1977, Vol. 1, p. 195.

After World War II much work was done to determine the necessary amount of manganese to be added to the open hearth process and its effect on the sulphur content and the operating temperature of the hearth. It is claimed that to date Soviet open hearth production amounts to 2.5 million tons per annum. Some of the large open hearth furnaces have a capacity of 500 tons and are equipped with measuring devices to permit full automation of the process. The main trouble with the open hearth process is the high temperature of the molten metal in the ladle. The main trouble with the open hearth process is the high temperature of the molten metal in the ladle. The main trouble with the open hearth process is the high temperature of the molten metal in the ladle. There are 12 Soviet references.

Card 6/21

SOV/137-58-9-18582

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 9, p 58 (USSR)

AUTHORS: Churakov, M.M., Khlebnikov, A.Ye.

TITLE: On the Problem of Improving the Scrap-smelting Technology of High-grade Steel in Basic Open-hearth Furnaces (K voprosu uluchsheniya tekhnologii vyplavki kachestvennoy stali skrap-protsessom v osnovnykh martenovskikh pechakh)

PERIODICAL: V sb.: Staleplavil'n. proiz-vo. Moscow, Metallurgizdat, 1958, pp 27-43

ABSTRACT: Ten separate smeltings were carried out in order to evaluate the expediency of smelting structural Cr-Ni steel in 30-ton, fuel-oil-operated, open-hearth furnaces employing no O₂ and operating in accordance with a novel technique which provides for an intensified boil period of the molten metal with a low Mn content during that period (no Fe-Mn is added) and involves the utilization of Si-Mn for purposes of preliminary de-oxidation. The new procedure reduced the duration of the smelting operation by approximately 12%, the average time being 7 hours and 36 minutes. 34% of Mn contained in the Si-Mn was oxidized and 66% of this element was utilized (as contrasted

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SOV/137-58-9-18582

On the Problem of Improving the Scrap-smelting Technology (cont.)

with 58.9% in the case of standard technology). As the Mn content decreases in the course of a boil, the content of S remains unchanged and constitutes 0.013-0.015%. Only Si-Mn (in amounts of 7-8 kg/t) is employed for deoxidation of steel, thus making it possible to reduce the weight quantity of the reductant by one third, to correspondingly lower the amounts of gases and nonmetallic inclusions being introduced into the molten metal, and to reduce the content of P which, in a finished steel, amounts to 0.0136%. In addition, deoxidation may be carried to completion if the steel contains 0.25-0.27% of C instead of 0.19-0.21%. The novel technique reduces the consumption of Mn and Si by 6 and 24%, respectively, but increases the consumption of Cr by 8%. Compared with metal obtained in standard smelting procedures, the steel produced by the novel technology is characterized by increased plasticity and a greater α_k .

L.K.

1. Chromium-nickel alloys--Test methods
2. Open hearth furnaces--Performance
3. Manganese--Oxidation
4. Manganese--Consumption
5. Silicon--Consumption

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18.3200

75971

SOV/133-59-10-32/39

AUTHORS: Verbol'skaya, Ye. D., Smolenskiy, S. I. (Deceased), (Engineers
Khlebnikov, A. Ye. (Doctor of Technical Sciences, Professor)

TITLE: Effect of Deoxidation by Calcium-Silicon on Properties of
Chrome-Nickel-Molybdenum Steel

PERIODICAL: Stal', 1959, Nr 10, pp 938-942 (USSR)

ABSTRACT: At Lower Dnepr Plant imeni K. Liebknecht (Nizhne-Dneprovskiy
zavod imeni K. Libknekht), Magnitogorsk Combine (Magnito-
gorskiy kombinat) and Combine imeni Serov (kombinat imeni
Serova) calcium-silicon deoxidation drastically reduced
the number of aluminate inclusions. The beneficial effect
of calcium alloys on the distribution and shape of oxysul-
fide inclusions had been previously established. /Ref 4,
Right, D., Iron and Steel, 1945, Vol 18, Nr 14/. The authors
tested calcium silicon in deoxidizing chrome-nickel-molyb-
denum steel for intricate shape casting with the following
purpose: (1) increase of plasticity and ductility of metal,
and (2) production of sound castings with fibrous frac-
tures (without intracrystalline fracturing). Throughout
all tests melting temperatures were maintained within the

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Effect of Deoxidation by Calcium-Silicon
on Properties of Chrome-Nickel-Molybdenum Steel

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1570 to 1600 C range. Two plates cast from each melt into a dry sand-loam mold were heat treated. Bars were cut out after heat treatment, broken under a pile driver for fracture tests, macrotemplets and specimens for tensile and impact strength tests were prepared as well as microsections for the study of nonmetallic inclusions. Mechanical properties data of steel deoxidized by different quantities of calcium are shown by way of comparison in Figure 2. The authors conclude as follows: (1) The substitution of calcium-silicon for aluminum in the final deoxidation of steel improves plasticity and ductility owing to the formation of more favorably shaped nonmetallic inclusions in primary grains; (2) the optimal quantity of calcium-silicon to be introduced to produce steel without surface porosity and with high mechanical properties is 0.15% Ca; (3) evidently, improved plastic properties allow increasing strength characteristics by increasing the carbon content without affecting plasticity (see Table 1). The authors recommend the continuation of experimental deoxidation with calcium-silicon in lieu of aluminum. There are 5 figures; 1 table; and 4 references, 3 Soviet, 1 U.S. The U.S. reference is: Right, D., Iron and Steel, 1945, Vol. 18, No. 14.

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Effect of Deoxidation by Calcium-Silicon,
on Properties of Chrome-Nickel-Molybdenum Steel

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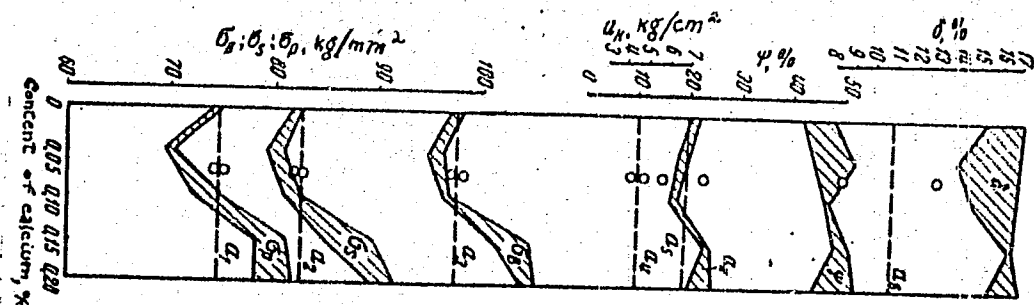


Fig. 2. $a_1 - a_5$ steel deoxidized with aluminum: σ_B = ten-
sile strength; σ_s = yield limit; σ_p = proportional limit;
 a_k = impact strength; ψ = reduction of area; δ = elongation.

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Effect of Deoxidation by Calcium-Silicon
on Properties of Chrome-Nickel-Molybdenum Steel

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Performance figures of mechanical properties of chrome-nickel-molybdenum steel samples of industrial (nominator) and experimental (denominator) castings

Table 1

Specimens	Brinell Hardness mm						
		σ_B , kgf/cm ²	$\sigma_{0.2}$, kgf/cm ²	$\sigma_{0.1}$, kgf/cm ²	δ , %	ψ , %	a_k , kgf/cm ²
Transverse	3.65—3.80 3.70—3.75	93.9	80.7	70.1	15.8	49.1	9.7
Vertical		94.4	80.3	71.4	17.8	57.6	10.6
Horizontal		94.15	79.5	72.3	16.1	48.6	8.4
		93.6	79.1	72.5	18.5	61.5	11.0
		92.3	78.5	70.65	15.3	43.1	8.3
	94.0	79.5	70.4	17.8	56.1	11.0	

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KHLEBNIKOV, A. Ye.

ZORIN, G. D. and KHLEBNIKOV, A. Ye.

Tipy kineticheskogo obzaglerashivaniya i gazosoderzhaniya v metalle.

report submitted for the 5th Physical Chemical Conference on Steel Production, Moscow, 30 Jun 1959.

OSKAROV, A. K. and KHLEBNIKOV, A. Ye.

Intensifikatsiya pereda dorezki martenovskogo skrup-protsessa.

report submitted for the 5th Physical Chemical Conference on Steel Production, Moscow, 30 Jun 1959.

VERGOL'NIAYA, Ye. D.; KASHTIKOV, G. F.; IMANOV, I. V.; KHLEBNIKOV, A. Ye.

Vliyaniye spetsificheskikh usloviy na svoystva khromo-nikeliy-molibdenovoy stali.

report submitted for the 5th Physical Chemical Conference on Steel Production, Moscow, 30 Jun 1959.

КОНВЕРТЕРНОЕ ПРОИЗВОДСТВО СТАЛИ

В.М.Васильевский Исследования скорости металлизации и содержания азота в конвертерной стали.

В.М.Подберезин Н.П.Иванов А.Е.Ковалевский А.М.Степанов Лабораторные опыты на прочность приращенно-металлизированной чугуна.

М.П.Соболев В.Д.Варламов М.П.Костин Исследования на прочность металлизированной конвертерной стали.

М.М.Шульман Передача азота в конвертерной стали с ограниченным азотсодержанием.

Т.Д.Андреев В.М.Гурьев В.Д.Варламов Выработка стали в конвертере на приращенно-металлизированной чугуна.

В.М.Васильевский Ю.А.Пурманов Исследования скорости металлизации конвертерной стали при азотном раскислении.

А.М.Маслов А.С.Осипов Содержание азота в металле при различных режимах конвертерного производства.

С.Г.Афанасьев М.М.Шульман М.П.Костин Исследования скорости металлизации конвертерной стали при азотном раскислении.

report submitted for the 5th Physical Chemical Conference on Steel Production, Moscow-- 30 Jun 1959.

KHLEBNIKOV, A.Ye.

Soveshaniye po prikladnoy tekhnologii rudykh elementov dlya razvitiya fiziko-mekhanicheskikh svoystv konstruktsionnykh spetsial'nykh stalей i legirovaniy

Razkrytie nulyakh elementy v stalyakh i splavakh. Uroki sovetskoy... (Rare Earth Elements In Steels and Alloys). To Improve the Properties of Special Steels Conference on Metallurgical Science, Vol. I, No. 1, Moscow, Mashinostroyeniye Publ., 1959.

cal and Alloy) Moscow, Mashinostroyeniye, 1959.
inscribed. 3,150 copies printed.

Md.: A. A. Frozhegov; Ed. of Publishing House: A. L. Ozeretzkaya;
Tech. Ma.: P. G. Isent'yev.

PURPOSE: This book is intended for engineers, technicians and scientists engaged in the metallurgy of heavy educational steels, and may also be used by students of higher technical schools who are specializing in the metallurgical science of these metals. The articles which give general results of investigations and uses of rare earths as alloying components in steels and alloys. The influence of rare earth elements on the mechanical properties of structural steel, resistant and other steels and alloys is also given each figure, tables and references (mostly Soviet) accompany each article. No personalities are mentioned.

Logan, B. L.; Candidate of Technical Sciences, Institute of Microscopy, Gosnauil i kristallograficheskii tsentr, AN SSSR (Institute for Mineralogy, Geochemistry and Crystallography of Rare Earth Elements, USSR); The State of Rare Metals Production and the trend in its development (According to non-Soviet literature)

Vorobeychikov V. V., Engineer, Candidate of Chemical Sciences
M. M. Nikolayev and R. P. Kuz'mina, Engineers, Methods of Determining Small Amounts of Rare Earths in Steels 26

Savitskiy, Ye. M., Doctor of Chemical Sciences, V. F. Yakubovich, Candidates of Technical Sciences, and Y. A. Zaslavsky, Engineer,
Investigation of the Physicochemical Interaction of Rare Earth Metals With Iron and Steel 31

Zasimkov, S. Ya., Engineer, Effect of Rare Earths on the Solubility and Oxygen Contents of Molten Steel and the State of Sulphur in Solid Steel 50

Eltyshev, V. S., Engineer Dependency of the Mechanical Properties of Structural Steel STKM3A on Reducing Agents and Methods of Extraction 77

Gulyayev, B. E., Doctor of Technical Sciences, I. A. Shapranov, Candidates of Technical Sciences, C. N. Krut'ko, Graduate of Technical Sciences, and L. D. Reznikova, Engineer— Influence of Rare Earths on the Crystallization and Mechanical Properties of Cast Steel 92

Vorobel'skaya, Ye. D., Engineer, I. V. Isaakov, Engineer; and A. Ye. Dubashnikov, Doctor of Technical Sciences, The Effect of Calcium Additives on the Properties of Cr-Mn-No Steel for Shapes Steel Casting 118

Dol'dzhetaeva, Ye.-Ye., Candidate of Technical Sciences, and G. M. Zhizhakina, Engineer, The Effect of Cerium on the Structure and Properties of Cast and Forged Steel 130

Kopylov, I. P., Candidate of Technical Sciences, and V. M. Gerasimov, Candidate of Technical Sciences, Study of the Effect of Rare Earths on the Physicomachanical Properties of Cr-Mn-No Steel 155

Studintseva, M. A., Candidate of Technical Sciences;
Yu. K. Kononov, Engineer and A. I. Sokolikov, Engineer,
The Influence of Rare Earths on the Nature of Fracture and the Structure and Properties of Steel 183

Benditskiy, G. T., Candidate of Technical Sciences;
S. V. Mal'tsev, Doctor of Technical Sciences; M. V. Poplavtsov, Titanium Alloys 196

Trofimoff, V. M., Candidate of Technical Sciences, and V. M. Burrov, Engineer, Electrochemical Method of Producing Misch Metal— Magnesium Alloys for Modified Cast Iron 204

Koppe, L. F., Candidate of Technical Sciences; L. M. Shidolina, Engineer; and D. D. Sudukova, The Problem of Increasing the Plasticity of Zn-Al-Cu Type Condition With Rare Earths 211

S/137/60/000/009/025/029
A005/A001

Translation from: Referativnyy zhurnal, Metallurgiya, 1960, No. 9, pp. 261-262,
21636

AUTHORS: Verbol'skaya, Ye.D., Isakov, I.V., Khlebnikov, A.Ye.

TITLE: The Effect of Cerium Admixtures on the Properties of Chrome-Nickel-Molybdenum Steel for Shaped Steel Castings 18

PERIODICAL: V sb.: Redkozemel'n. elementy v stalyakh i splavakh, Moscow, Metallurgizdat, 1959, pp. 118-129

TEXT: A study was made of the effect of Ce introduced in the form of misch metal as a deoxidizer, on the micro- and macrostructure, S distribution, and the mechanical properties of Cr-Ni-Mo steel containing 0.36-0.41% C. Experimental melts were made in 150-kg open and vacuum furnaces with deoxidation by 0.07% Al or 0.2 or 0.3% misch metal. It was established that processing of Cr-Ni-Mo steel with misch metal admixtures (0.2-0.3%) containing 40-60% Ce, increased a_k of the steel by a factor of 2.0 to 2.5. ✓

T.F.

Translator's note: This is the full translation of the original Russian abstract.
Card 1/1

LINCHEVSKIY, Boris Vadimovich; VERTMAN, Aleksandr Abramovich;
KHLIBNIKOV, A.Ye., prof., doktor tekhn.nauk, red.; ROZEN-
TSVIG, Ia.D., red. ~~isd-vo~~; DOBUZHINSKAYA, L.V., tekhn.red.

[Use of vacuum processes in steelmaking] Primenenie vakuumma
v proizvodstve stali. Moskva, Gos.nauchno-tekhn.isd-vo
lit-ry po chernoi i tsvetnoi metallurgii, 1960. 125 p.
(MIRA 12:12)
(Steel--Metallurgy) (Vacuum metallurgy)

KHLEBNIKOV, A.YE.

PLATE I BOOK REFERENCE

507/2558
507/2558-5

Abstracts from USSR. Isolated metallurgy.

Metallurgy, metallurgy, plate metallurgy, metal isolation, metallurgical research methods in metallurgy and metal science. Moscow, Izdatel'stvo AN SSSR, 1980. 521 p. (Series: Iss. Tekh. Vop. 5) Extra all. Issued. 2,000 copies printed.

Sponsoring Agency: Abstracts from USSR. Isolated metallurgy from A.S. Bykov. Ser. Ed.: I.P. Bardin, Academician (Deceased); Ed. of Publishing House: V.A. Il'inskiy, Tech. Ed.: Z.P. Polunova.

NOTE: This collection of articles is intended for metallurgists and metal researchers.

CONTENTS: The collection contains articles on metallurgy, metal science, and metallurgical research methods. Separate articles discuss the structure and properties of metal alloys and alloys. The effect of cold treatment and mechanical treatment on the properties of alloys are analyzed, and instruments and methods for studying the properties of alloys are described.

Editor: I.S. and A.M. Bardin. Study of the Metal Absorption Capacity of Magnesium Oxide and Calcium Oxide.

Part 1. I.S. Bardin, Academician (Deceased); Ed. of Publishing House: V.A. Il'inskiy, Tech. Ed.: Z.P. Polunova.

Part 2. I.S. Bardin, Academician (Deceased); Ed. of Publishing House: V.A. Il'inskiy, Tech. Ed.: Z.P. Polunova.

Part 3. I.S. Bardin, Academician (Deceased); Ed. of Publishing House: V.A. Il'inskiy, Tech. Ed.: Z.P. Polunova.

Part 4. I.S. Bardin, Academician (Deceased); Ed. of Publishing House: V.A. Il'inskiy, Tech. Ed.: Z.P. Polunova.

Part 5. I.S. Bardin, Academician (Deceased); Ed. of Publishing House: V.A. Il'inskiy, Tech. Ed.: Z.P. Polunova.

Part 6. I.S. Bardin, Academician (Deceased); Ed. of Publishing House: V.A. Il'inskiy, Tech. Ed.: Z.P. Polunova.

Part 7. I.S. Bardin, Academician (Deceased); Ed. of Publishing House: V.A. Il'inskiy, Tech. Ed.: Z.P. Polunova.

Part 8. I.S. Bardin, Academician (Deceased); Ed. of Publishing House: V.A. Il'inskiy, Tech. Ed.: Z.P. Polunova.

Part 9. I.S. Bardin, Academician (Deceased); Ed. of Publishing House: V.A. Il'inskiy, Tech. Ed.: Z.P. Polunova.

Part 10. I.S. Bardin, Academician (Deceased); Ed. of Publishing House: V.A. Il'inskiy, Tech. Ed.: Z.P. Polunova.

Khlebnikov, A. Ye.

PLANE 1 BOOK EXPLANATION	207/416
Vsesoyuznyy nauchnoissledovatel'skiy tsentr po spetsial'noy metallurgii. 1st, Moscow, 1957	
Booklet metallurgiya i fizika. 1st ed. (Rare Metals and Alloys) Translations of the	
1st All-Union Conference on Rare-Metal Alloys. Moscow, Metallurgizdat, 1960.	
1st Pt. 2, 126 copies printed.	
Sponsoring agencies: Akademiya nauk SSSR, Izdatel'stvo metalurgii, USSR	
Metallurgiya po redkim metallam pri nauchno-tekhnicheskoy tematike.	
Ed. I. I. Shapovalov, Ed. of Publishing House: O.M. Izrael'skiy, Tech. Ed.: P.O. Izrael'skiy.	
PREFACE: This collection of articles is intended for metallurgical engineers, scientists, and workers in the machine-building and radio-engineering industries. It may also be used by students of schools of higher education.	
CONTENTS: The collection contains technical papers which were presented and discussed at the First All-Union Conference on Rare-Metal Alloys, held in the Institute of Metallurgy, Academy of Sciences USSR in November 1957. The results of investigations of rare-metal alloys, titanium and copper-based alloys, alloys of titanium, zirconium, niobium and their alloys. The effect of rare-metal metals on properties of magnesium alloys and steels is analyzed. The uses of titanium as a dehydrogenating catalyst, electroplating material, and as a catalyst for the synthesis of organic compounds are discussed. Also, the effect of the addition of certain elements on the properties of high-strength steels is examined and alloys with special physical properties (particularly, superconducting alloys) are discussed. So personalities are mentioned. Soviet and American references accompany most of the articles.	
PART II. TITANIUM AND COPPER-BASED ALLOYS WITH RARE-METAL ADDITIONS	
Rare Metals (Cont.)	207/416
Kozlov, L. Study of the Effect of Rare-Earth Elements on Physicochemical Properties of Chromium-Nickel-Titanium Steels	283
Kozlov, L. Study of the Effect of Rare-Earth Elements on Properties of Chromium-Nickel-Titanium Steels Used for Shaped Castings	303
Kozlov, L. Study of the Effect of Rare-Earth Elements on Properties of Titanium Steels	316
Kozlov, L. and A. A. Zaslavskiy. Effect of Rare-Earth Elements on Certain Properties of Constructional Steels	323
Kozlov, L. and A. A. Zaslavskiy. Effect of Small Additions of Cerium, Lanthanum, Barium, Strontium, and Calcium on Properties of Heat-Resistant Steels	333
Kozlov, L. and G. A. Torgunov. Effect of Strontium on Properties of Steels	343
End 7/8	

BAPTIZMANSKIY, Vadim Ippolitovich; ~~KHLEBNIKOV~~, A.Ye., prof., doktor tekhn. nauk, retsenzent; KONDAKOV, V.V., prof., retsenzent; PTITSINA, V.I., red.izd-va; KARASEV, A.I., tekhn.red.

[Mechanism and kinetics of processes in the converter bath]
Mekhanizm i kinetika protsessov v konverternoi vanne. Moskva,
Gos.nauchno-tekhn.izd-vo lit-ry po chernoi i tsvetnoi metallurgii.
1960. 283 p.

(MIRA 14:1)

(Converters)

OMAROV, A.K.; SALEHEK, A.G.; KHEBEMIKOV, A.Ye.

Intensifying the finishing period in the open-hearth scrap process.
Inv.AN Uz.SSR. Ser.tekh.nauk. no.2:5-14 '60. (MIRA 13:10)

1. Institut metallurgii AN SSSR i Gornyy otdel AN UzSSR.
(Open-hearth process)

OMAROV, A.K.; KHLEBNIKOV, A.Ye.

Intensification of open-hearth smelting. Izv. AN Uz.SSR. Ser. tekhn.
nauk. no.2:15-20 '60. (MIRA 13:10)

1. Institut metallurgii AN SSSR i Gornyy otdel AN UzSSR.
(Open-hearth process)

S/167/60/000/003/004/XX
A104/A133

AUTHOR: Omarov, A. K., and Khlebnikov, A. Ye.

TITLE: On the behavior of hydrogen during the basic open-hearth scrap process

PERIODICAL: Izvestiya Akademii nauk UzSSR. Seriya tekhnicheskikh nauk, no. 3, 1960, 38 - 49

TEXT: The contradictory opinions expressed in Refs. 1 - 7 [Ref. 1: Yavoy'skiy, V. I., Gazy v vannakh staleplavil'nykh pechey (Gases in the baths of steelmelting furnaces), Moscow, Metallurgizdat, 1952; Ref. 2: Yavoy'skiy, V. I., Fiziko-khimicheskiye osnovy proizvodstva stali (The physical-chemical basis of steel production), Moscow, AN SSSR, 1957, 515 - 533; Ref. 3: Levin, S. L., Chuyko, N. M. et al., "Stal'", 1954, no. 2, 129 - 135; Ref. 4: Baptizmanskiy, V. I., The physical-chemical basis of steel production, Moscow, AN SSSR, 1957, 652 - 653; Ref. 5: Morosov, A. N., Vodorod i azot v stali (Hydrogen and nitrogen in steel), Moscow, Metallurgizdat, 1950; Ref. 6: Dobrokhotoy, N. N., Povolotskiy, D. Ya. et al., "Stal'", 1953, no. 9, 796 - 800; Ref. 7: Umrikhin, P. V., Kurochkin, K. G. et al., "Chernaya

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On the behavior of hydrogen during...

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A104/A133

metallurgiya", 1958, no. 1] and others, concerning the effect of technological factors on the hydrogen content in the metal during basic open-hearth smelting are discussed. Tests for the purpose of improving casting methods of rimming and killed steel in open-hearth furnaces were carried out at the Uzbekskiy metallurgicheskiy zavod (Uzbeksk Metallurgical Plant) by U. Rakhmankulov and Z. Zaporozhan. In all castings obtained by the conventional method the hydrogen content increases throughout the time of deoxidation during heat finishing, whereas in all castings obtained by the new method the hydrogen content decreases toward the end of heat finishing. Tests were carried out in 70-ton Martin furnaces with chromium-magnesite crowns heated with air-sprayed petroleum. The charge consisted of 33% cast iron, 67% scrap iron and chips. Twenty-five castings of Cr3cn(St3sp), Cr5(St5) and Cr25rc(St25gs) steels were obtained. In 18 castings the hydrogen content was determined after smelting, during the slag formation and burning, at the beginning of clean rimming, before deoxidation, tapping and during pouring. The remaining castings were inspected only during tapping and pouring. The metal and slag samples were subjected to chemical analysis, the temperature was measured with a tungsten-molybdenum immersion thermo-

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couple. Nine castings were obtained by the conventional method, at a rimming duration of 40 min or longer; for the remaining nine castings the duration of rimming was optional. The presence of oxygen in the steel was determined by pencil tests according to the vacuum-heating method proposed by G. I. Batalin [Ref. 8: "Zavodskaya laboratoriya", 1953, no. 5] at 600°C. The time between sample-taking and beginning of analysis was 10 - 13 min and the moisture of mazut amounted to 6 - 8%. A possible dependence between the hydrogen content after casting and total duration of charging and casting was examined, but no connection was revealed between these two factors. The tests proved that variations of the hydrogen content during heat finishing depend on the decarbonization rate of the bath and on the rising temperature of metal. At sufficiently intensive boiling of $V_o \geq 0.011\%/min$ the hydrogen content decreases even at maximum rate of temperature rising (2 - 2.20 per min). The value of critical decarbonization rate varies corresponding to the rising bath temperatures. During tapping and pouring the hydrogen content in metal decreases compared to its content prior to tapping. After deoxidation in the furnace the content of hydrogen increases corresponding to the rising temperature. There are 9 figures and 14 Soviet-bloc

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On the behavior of hydrogen during...

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references.

ASSOCIATION: Institut metallurgii AN SSSR. Gornyy otdel AN UzSSR (Institute
of Metallurgy AS USSR, Mining Section AS UzSSR)

SUBMITTED: July 31, 1959

Card 4/4

OMAROV, A.K.; KHLEBNIKOV, A.Ye.

Hydrogen behavior in the course of the basic open-hearth
scrap process. Izv. vys. ucheb. zav.; chern. met. no. 4:66-76
'60. (MIRA 13:4)

1. Institut metallurgii AN SSSR, i Uzbekskiy metallurgicheskiy
zavod.
(Open-hearth process) (Steel--Hydrogen content)

LEBEDEVA, S.I. (Moskva); RUDNEVA, A.V. (Moskva); KHLEBNIKOV, A.Ye. (Moskva)

Efficient technology of refining Kerch cast iron. Izv. AN SSSR.
Otd. tekhn. nauk. Met. i topl. no. 4:85-94 J1-Ag '60. (MIRA 13:9)
(Kerch--Iron ores) (Cast iron--Metallurgy)

KHLEBNIKOV, A.Ye.

Making use of results of mechanical testings to evaluate the process
of making and pouring of steel. Trudy Inst.met. no.5:36-42 '60.

(MLRA 13:6)

(Steel--Testing)

(Metallurgical plants--Quality control)

S/148/60/000/008/001/018
A161/A029

AUTHORS: Omarov, A.K.; Khlebnikov, A.Ye.

TITLE: Boosting the Open-Hearth Process by Desulfurizing Steel in the Ladle With Mixtures

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. - Chernaya metallurgiya, 1960, No. 8, pp. 29 - 33

TEXT: To eliminate the conventional means of reducing the sulfur content in steel in an open-hearth furnace during heat (charging ferromanganese, spiegel iron, or ore, repeatedly skimming and again producing slag) considerably delaying the end of the process, desulfuration in the ladle has been used at Verkh-Isetskiiy metallurgicheskiiy zavod (Verkh-Isetskoye Metallurgical Works) for transformer steel (Ref. 1) by a mixture of 80% lime and 20% fluorspar. Desulfuration to 50% was achieved with 1% (by weight) of this additive, but the experiments were carried out only with steel with more than 2.8% Si. The present article gives the results of treating rimming steel Ст. 3кп (St. 3kp), killed Ст. 3кв (St. 3sp) and Ст. 5 (St. 5) (with a Si content of up to 0.28%) with a mixture of lime, fluorspar and 45% ferrosilicon. Steel was smelted in basic open-hearth

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S/148/60/000/008/001/018
A161/A029

Boosting the Open-Hearth Process by Desulfurizing Steel in the Ladle With Mixtures

furnaces with magnesite-chromite vault, working by the scrap-process and fired with mazout (the mazout contained 0.53% S). The mixture for desulfuration in the ladle was prepared for killed steel using 70 - 80% freshly calcined lime, 15 - 20% fluorspar and 5 - 10% of 45-% ferrosilicon. An analogous mix but without ferrosilicon was used for rimming steel. The mix was prepared at the day of use; the components were ground into powder; 50% was added into the ladle before teeming and the rest into the metal jet flowing into the ladle during the first half of the ladle filling. The content of oxygen, hydrogen, nitrogen and non-metallic inclusions was determined by vacuum heating (Ref. 5), by the silica method, separation (Ref. 6) and electrolysis. The following conclusions were drawn: 1) Treatment in the ladle with a mix of 70 - 80% lime, 15 - 20% fluorspar and 5 - 10% ferrosilicon, in a quantity of 0.75 - 1.0% of the metal weight, reduces the S content by 23 - 30% at a 0.16 - 0.28% Si content in ready steel. 2) No effective desulfuration can be obtained in rimming steel with Mn 0.30 - 0.60% by treatment in the ladle. 3) The metal quality after treatment in the ladle remains on the level of the usual heat. 4) Desulfuration in the ladle cuts the heat time in case of high S content in metal at the moment of melting. There are 3 figures, 3 tables and 6 references: 4 Soviet, 1 German and 1 English.

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8/148/60/000/008/001/018
A161/A029

Boosting the Open-Hearth Process by Desulfurizing Steel in the Ladle With Mixtures

ASSOCIATION: Institut metallurgii AN SSSR (Institut of Metallurgy of the Academy of Sciences of the USSR)

SUBMITTED: June 18, 1959

Card 3/3

S/133/60/000/011/018/023
A054/A029

AUTHORS: Verbol'skaya, Ye.D., Zasetskiy, G.F., Isakov, I.V., Engineers,
Khlebnikov, A.Ye., Doctor of Technical Sciences

TITLE: Experience in the Treatment of Molten Steel With Rare-Earth
Metals

PERIODICAL: Stal', 1960, ¹⁰No. 11, pp. 1030-1033


TEXT: In order to obtain more information on the possibilities of improving the plastic properties of chrome-nickel-molybdenum alloys by the addition of rare-earth metals, tests were carried out (with the cooperation of Z.B. Vagonov and V.I. Belyayev) by treating these alloys with a mixed metal containing 40-50% cerium, 15-20% lanthanum, 10-20% other rare-earth metals and 5-10% iron. The test steel was melted in an induction vacuum furnace with a magnesite crucible of 150 kg capacity, the charge consisted of armco steel and synthetic iron, the melting temperature was 1,550-1,580°C; the alloying elements were added without affecting the vacuum after a certain interval for the degasification of the metal. Pouring took place in an argon atmosphere at a pressure of 600-700 mm Hg, the test ingots were 140 x 140 mm and weighed about 70 kg. Investigations to determine the influence of the rare-earth metal additives on the sulfur content and on the quantity of non-
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S/133/60/000/011/018/023
A054/A029

Experience in the Treatment of Molten Steel With Rare-Earth Metals

metallic inclusions revealed that under the effect of rare earth elements the non-metallic phase still forms in the liquid steel before the precrystallization period. The composite inclusions which are formed during this period coagulate easily and float on the surface of the casting. During this floating period these inclusions can be captured in the crust zone of the casting by the growing crystals. The total amount of sulfur in these agglomerations is about 0.18-0.19%, while the liquid steel before treatment with mixed metal contains about 0.024-0.030% S and the finished metal about 0.003-0.016% S. The sulfur residue in the metal decreases in proportion with the increase in the quantity of the mixed metal added, and the longer the metal is kept liquid, the larger is the amount of sulfur inclusions which can be removed from the casting. The quantity of oxide-inclusions also decreases in the rare-earth metal alloyed steels, irrespective of the melting method; only the amount of aluminates increases to some extent. The tests carried out to determine the mechanical properties of the new type steel showed that rare-earth metal alloyed steels of the same composition but cast in open and in vacuum furnaces had practically the same values as regards strength and tenacity, in cast and in

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A054/A029

Experience in the Treatment of Molten Steel With Rare-Earth Metals

rolled condition as well; the steel melted in a conventional furnace has a tenacity 1.5-2.0 times higher than the same type of steel deoxidized by 0.07% Al; when melted in a vacuum furnace, the increase in tenacity is 2-2.5 times greater compared with the Al-treated steels; the steel with a C-content of 0.40% shows the same plastic properties in melted and in rolled condition as the chrome-nickel-molybdenum steels containing 0.30%C and produced in open-hearth furnaces according to the direct reduction process. In the rolled steels containing 0.40% C and alloyed with rare-earth metals no anisotropy in the mechanical properties can be observed at tempering, both as regards the sorbite and the martensite structure. The laboratory tests were confirmed by industrial scale tests in the UZTM. The samples taken from various (upper and lower) parts of the sheets rolled from the test ingots (with a C content of 0.41% containing chrome-nickel-molybdenum deoxidized in the ladle by 350 g/t Al and containing 2 kg/t mixed metal) displayed remarkable chemical homogeneity. Practically no segregation of carbon, sulfur and phosphorus could be observed. From the tests it is assumed that rare-earth metal alloyed chrome-nickel-molybdenum steels can be used in machinery constructions for replacing rolled or hammered machinery parts. There are 2 figures, 6 tables and 3 Soviet references.

Card 3/3

KHLEBNIKOV, A. Ye.

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PHASE I BOOK EXPLOITATION

SOV/5411

Konferentsiya po fiziko-khimicheskim osnovam proizvodstva stali. 5th,
Moscow, 1959.

Fiziko-khimicheskiye osnovy proizvodstva stali; trudy konferentsii
(Physicochemical Bases of Steel Making; Transactions of the
Fifth Conference on the Physicochemical Bases of Steelmaking)
Moscow, Metallurgizdat, 1961. 512 p. Errata slip inserted.
3,700 copies printed.

Sponsoring Agency: Akademiya nauk SSSR. Institut metallurgii imeni
A. A. Baykova.

Responsible Ed.: A. M. Samarin, Corresponding Member, Academy
of Sciences USSR; Ed. of Publishing House: Ya. D. Rozentsveyg.
Tech. Ed.: V. V. Mikhaylova.

Card 1/16

Physicochemical Bases of (Cont.)

SOV/5411

PURPOSE: This collection of articles is intended for engineers and technicians of metallurgical and machine-building plants, senior students of schools of higher education, staff members of design bureaus and planning institutes, and scientific research workers.

COVERAGE: The collection contains reports presented at the fifth annual convention devoted to the review of the physicochemical bases of the steelmaking process. These reports deal with problems of the mechanism and kinetics of reactions taking place in the molten metal in steelmaking furnaces. The following are also discussed: problems involved in the production of alloyed steel, the structure of the ingot, the mechanism of solidification, and the converter steelmaking process. The articles contain conclusions drawn from the results of experimental studies, and are accompanied by references of which most are Soviet.

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Physicochemical Bases of (Cont.)

SOV/5411

Ladyzhenskiy, B. N., and M. V. Karakula. Making Low-Carbon Alloyed Steels in Acid Open-Hearth Furnaces

27

Stroganov, A. I., and A. N. Morozov. Behavior of Chromium in the Bath of a Basic Open-Hearth Furnace

39

Petukhov, B. G. Making Chromium-Nickel Steels in Large Open-Hearth Furnaces With the Use of Nickel Oxide

46

Omarov, A. K., and A. Ye. Khlebnikov. Intensifying the Working Period of the Open-Hearth Scrap Process

54

[The following persons participated in the research work:
Engineer Munasypova, Engineer T. Kovaleva, and Technicians
U. Rakhmanulov, V.V. Ponomareva, L. Rusnyak, Z. Zaporozhan,
A. Perkova, S. Bilyalova, and V. Guseva.]

Card 4/18

Physicochemical Bases of (Cont.)

SOV/5411

Panov, A. S., and P. N. Perchatkin. Comparison of the Desulfurizing Capacity of Oxides During the Melting Period in Processing Low-Manganese Pig Irons

66

Shneyerov, Ya. A., A. G. Kotin, and A. G. Derfel'. Accelerating the Open-Hearth Process in the Preparation of the Charge (Pig Iron and Loose Materials)

70

Shneyerov, Ya. A., A. I. Sukachev, and A. G. Kotin. Accelerating the Slag Formation and Melting Processes by Blowing Oxygen Into the Bath During the Meltdown Period

81

Kazachkov, Ye. A. Kinetics of the Oxidation of Low-Concentrated Carbon in the Open-Hearth Bath

88

Zorin, O. D., and A. Ye. Khlebnikov. The Kinetic Decarburization

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Physicochemical Bases of (Cont.)

SOV/5411

Regime and the Gas Content in Metal

94

Povolotskiy, D. Ya., I. A. Lubenets, M. I. Kolosov, D. Ya. Vaynshteyn, and A. N. Morozov. Desiliconizing With Oxygen for Pig Iron Open-Hearth Furnaces

99

Shalimov, A. G., and A. K. Petrov. Investigating the Effectiveness of Treating the Molten Electric Steel by Synthetic Lime-Alumina Slag

106

[The investigation was conducted under the guidance of S. G. Voinov, Candidate of Technical Sciences, with the participation of staff members of TsNIIChM (Central Scientific Research Institute of Ferrous Metallurgy) A. I. Osipov, Candidate of Technical Sciences, Ya. M. Bokshitskiy, Engineer, A. G. Shalimov, Candidate of Technical Sciences, L. F. Kosoy, Engineer, A. I. Polyakov, and staff members of the Zlatoustovskiy metallurgicheskiy zavod

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Physicochemical Bases of (Cont.)

SOV/5411

(Zlatoust Metallurgical Plant) A.K. Petrov, Engineer, O.M. Chekhomov, G.A. Khasin, A.I. Markelov, I.S. Kutuyev, R.I. Kolyasnikova, and Ye. D. Mokhir.)

Paton, B. Ye., B.I. Medovar, Yu. V. Latash, B.I. Maksimovich, and A. F. Tregubenko. Electroslag Remelting of Alloyed Steels and Alloys as an Effective Means for Improving Their Quality

118

Verbol'skaya, Ye. D., G. F. Zasetskiy, I. V. Isakov, and A. Ye. ~~Khitchnikov~~. Various Methods of Treating Molten Chromium-Nickel-Molybdenum Steel and Their Effect on Its Properties

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Yedneral, F. P. Application of Complex Deoxidizers for the Purpose of Shortening the Reduction Period of Electromelting of Constructional Steels

137

Yedneral, F. P. The Change in the Bath Composition of an Electric-

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Physicochemical Bases of (Cont.)

SOV/5411

- Dynamics of Processes in the Converter Molten Metal 227
- Levenets, N. P., V. M. Pobegaylo, A. M. Samarin, and A. Ye. Khlebnikov. Laboratory Experiments in Blowing Naturally Alloyed Pig Irons 237
[Correct title in the text: Oxidation of Chromium and Phosphorus in Oxygen Top-Blowing of Metal]
- Sobakin, M. P., and Ya. D., Verbitskiy, Study by Modeling of the Molten-Metal Hydrodynamics in a Converter During Decarburization 245
[Senior Engineer V. N. Shashkov and Foreman M. Ye. Novikov participated in the research work]
- Kvitko, M. P. Processing of Pig Iron With a High Manganese Content (4%-8%) in a Converter With the Use of the Oxygen [Blast] 256

Card 10/16

APPROVED FOR RELEASE: 09/17/2001 (Moscow) CIA-RDP86-00513R000722030001

Effect of preliminary treatment and the composition of slag mixtures on the steel dephosphorization process. Izv. AN SSSR. Otd. tekhn. nauk. Met. i topl. no.1:20-23 Ja-n '61. (MIRA 14:2)
(Steel--Metallurgy) (Slag--Analysis)

KHLEBNIKOV, A.Ye.

Oxysulfide woody structure of steel. Trudy Inst. met.
no.8:40-53 '61. (MIRA 14:10)
(Steel--Metallography) (Steel--Defects)

BURTSEV, V.T.; KARASEV, R.A.; POBEGAYLO, V.M.; SAMARIN, A.M.; KHLEBNIKOV, A.Ye.

Desulfuration of liquid iron in vacuum. Izv. vys. ucheb. zav.;
chern. met. 5 no.5:86-93 '62. (MIRA 15:6)

1. Institut metallurgii im. Baykova.
(Iron-metallurgy) (Desulfuration)

LEVENETS, N.P.; POBEGAYLO, V.M.; SAMARIN, A.M.; KHLEBNIKOV, A.Ye.

Experiments in oxygen blowing of Khalilovo cast iron. Trudy Inst.
met. no.11:31-35 '62. (MIRA 16:5)
(Khalilovo—Cast iron) (Oxygen—Industrial applications)

CHURAKOV, M.M.; RUDAKOV, I.P.; KHLEBNIKOV, A.Ye.

Hydrogen behavior during the smelting of steel for shaped casting.
Izv. vys. ucheb. zav.; chern. met. 6 no.11:47-53 '63.

(MIRA 17:3)

ZAVERSHINSKIY, Yu.V., kand. tekhn. nauk; KHLEBNIKOV, A.Ys., prof.,
doktor tekhn. nauk.

Formation of scab on steel ingots and ways to prevent it.
Stal' 25 no.2:122-125 F '65. (MIRA 18:3)

L 45435-66 EWT(m)/EWP(w)/T/EWP(t)/ETI IJP(c) JD

ACC NR: AP6019765

(A)

SOURCE CODE: UR/0370/66/000/003/0003/0018

AUTHOR: Kravchenko, V. F. ^(Moscow); Isakov, I. V. ^(Moscow); Khlebnikov, A. Ye. ^(Moscow); Dashevskiy, Yu. A. ^(Moscow); Lebedev, Ya. I. ^(Moscow); Selivanov, N. M. ^(Moscow)

ORG: none

TITLE: Improving the quality of open hearth steel by treating it with rare earth metal alloys

SOURCE: AN SSSR. Izvestiya. Metally, no. 3, 1966, 3-18

TOPIC TAGS: rare earth metal, metallurgic process, metal physics, metal property, *steel property, mechanical property, steel/40Kh2NMa steel*

ABSTRACT: There is very little published information concerning the effect of rare earth metals (REM) on the properties of steel, and on the optimum conditions for the use of such metals. This paper investigates the effects of REM on specific properties of steel, notes procedures for alloying steel, and indicates optimum REM content to achieve desired combinations of mechanical properties. Chemical thermodynamic data and composition of REM alloys are presented in order to provide a better understanding of the principles involved in alloying steel with REM. Experimental melts were produced in a 150 ton induction furnace as well as in 25 and 200 ton basic open hearth furnaces. Mishmetal, a rare earth alloy containing 56.1% Ce and 41.3% La (other REM, iron, and impurities totaled 2.6%), was used as the deoxidizing agent. Studies were made of both cast and wrought metal states and tables of mechanical properties are in-

UDC: 669.141.243.4

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L 45435-66

ACC NR:AP6019765

cluded. The impact strength of steel 40Kh2NMa, melted in a 25 ton furnace and top-poured at 1580°C, is given. Results of the experiments showed that in all cases the addition of REM increased steel ductility. This increase was greatest when the mishmetal was able to reduce sulfur content in the solidified ingot. Desulfurization was best accomplished when it was initiated in the ladle prior to pouring into the mold. Optimum conditions were concluded to be ladle deoxidation and desulfurization by adding 0.15-0.20% mishmetal (calculated) to the molten steel (1560-1580°C) immediately after tapping from the furnace. The mishmetal reaction begins and most of the sulfur is removed by the time the steel is poured and solidified. The procedure lowers the sulfur content 25 to 30%. The mishmetal significantly reduces nonmetallic inclusion content, as well as changing the shape, composition, and distribution of that content. Finally, the REM alloy increases impact strength of the rolled steel 27 to 47% (transverse test samples) and of cast steel by 47 to 65%, with a simultaneous increase in ductility. Orig. art. has: 12 tables and 6 figures.

SUB CODE: 11/

SUBM DATE: 25 May 64 / ORIG REF: 026 / OTH REF: 001

LS

Card 2/2

ENT(L)/EPF(c)/EPR/ENF(5)/T PC-4/Pr-4/PS-4 FPL R16/AN
 9/0190/65/006/010/1799/1801

Sharkova, V. V.; Kilmova, V. M.; Kilmova, V. M.

Copolymerization of vinylhydroquinone dibenzoate with acrylic and methacrylic acids

SOURCE: Vy sokomolekulyarnyye soyedineniya, v. 6, no. 10, 1964, 1799-1801

TOPIC: vinylhydroquinone dibenzoate, acrylic acid, methacrylic acid, quinone copolymerization, polyacrylic acid, polymethacrylate, azoisobutyronitrile

ABSTRACT: The copolymerization of vinylhydroquinone dibenzoate (VHD) with acrylic (AC) and methacrylic acid (MAC) was carried out in sealed Carrius tubes in the presence of azoisobutyronitrile (1% by weight of the monomers). The copolymers were washed with water, dried, and precipitated with one of the following solvents: petroleum ether, ether or acetic acid. The material was dried in a vacuum at 60°C, and the results of the experiment were analyzed for monomer activity by the integral method of Mayo and Lewis. The values of r_1 and r_2 for the AC-VHD pair were found to be 0.44 ± 0.13 and 0.95 ± 0.002 , respectively. For the MAC-VHD pair, they

L 33945-65

ACCESSION NR: AF4047205

have 1.91 ± 0.23 and 0.91 ± 0.25 , respectively. The specific activity (Q) of
n. data from its copolymerization with α -methylstyrene (c) 0.06,
VHD with MAC C was 1.80 and c was 0.04. On the basis of these data,
conclude that the specific activity of the copolymer is of
the same order of as that of styrene. Orig. art. part 1 of 2 tables.

ASSOCIATION: Leningradskiy tekhnologicheskii institut im. Lenseveta (Leningrad
technological institute)

SUBMITTED: 02Dec63

ENCL: 00

SUB CODE: 00

NO REF SOV: 001

OTHER: 007

Card 2/2

SOV/124-58-11-12993

Translation from: Referativnyy zhurnal, Mekhanika, 1958, Nr 11, p 161 (USSR)

AUTHORS: Sheremet'yev, M. P., Khlebnikov, D. G.

TITLE: Elastic Equilibrium of a Halfplane Supported Along the Edge
(Uprugoye ravnovesiye poluploskosti s podkreplennym krayem)

PERIODICAL: Dopovidi ta povidomlennya. L'vivs'k. un-t, 1957, Nr 7, part 3,
pp 286-292

ABSTRACT: The authors examine the problem of the elastic equilibrium of an isotropic halfplane $y \leq 0$, the boundary of which is soldered to an infinitely long, thin, elastic rod of constant stiffness; the halfplane is subjected to the action of distributed transverse and longitudinal loads, as well as bending moments of magnitudes $q(x)$, $n(x)$, and $m(x)$. One of the principal axes of inertia of every transverse cross section of the rod lies in the plane under consideration. Let $f(x)$ and $g(x)$ be the normal and the tangential stresses on the contour of the soldered joint. It is demonstrated that $f(x)$ and $g(x)$ satisfy the following system of integral-differential equations

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SOV/124-58-11-12993

Elastic Equilibrium of a Halfplane Supported Along the Edge

$$G_1 \alpha f'(x) - g(x) + G_1 \frac{\beta}{\pi} \int_{-\infty}^{+\infty} \frac{g'(t)dt}{t-x} n(x)$$

$$G_2 \frac{\beta}{\pi} \int_{-\infty}^{+\infty} \frac{f'''(t)dt}{t-x} + f(x) - F_2 \alpha g'''(x) = \frac{dm}{dx} - q(x)$$

where α and β are certain elastic constants of the halfplane, and G_1 and G_2 are the stiffnesses of the rod with respect to tension and flexure. By expressing $q(x)$, $n(x)$, and $m(x)$ in the form of Fourier integrals, the authors obtain implicit formulae for the solution of this system. The Fourier integrals representing the solution are convergent only if $q(x)$, $n(x)$, and $m(x)$ are absolutely integratable and if, in addition, $n(x)$ and $m(x)$ possess an integratable derivative that is finite everywhere.

N. A. Rostovtsev

Card 2/2

SHERMET'YEV, M.P. [Sheremet'iev, M.P.] (L'vov); KHLEBNIKOV, D.G.
[Khliebnikov, D.H.] (L'vov)

Bending of an infinite strip with a reinforced edge. Prikl.mekh.
7 no.2:212-126 '61. (MIRA 14:4)

1. L'vovskiy gosudarstvennyy universitet.
(Elastic plates and shells)

SHERMET'YEV, M.P.; YAREMA, S.Ya.; KHLEBNIKOV, D.O.

Selecting the optimum shape for a circular metal-glass kinescope.

Nauch.zap.IMA AN URSR. Ser.mashinoved. 7 no.7:96-109 '61.

(MIRA 15:1)

(Television--Apparatus and supplies)

STEPANTSOV, V., kand. biolog. nauk; KHLEBNIKOV, G., kand. med. nauk

Overtension and means for increasing the resistance of the
organism. Av. i kosm. 45 no.1:44-48 Ja '63.
(MIRA 16:1)

(Aviation medicine)

L 10807-66 FSS-2/ENT(1)/FS(✓)-3 DD/RD
 ACC NR: RP6000254 SOURCE CODE: UR/0209/65/000/011/0027/0032

AUTHOR: Kas'yan, I.; Kopanov, V.; Lebedev, V.; Khlebnikov, G.; Kolosov, I.

ORG: none

TITLE: On an airplane in a state of weightlessness. ² Results of research

SOURCE: Aviatsiya i kosmonavtika, no. 11, 1965, 27-32

TOPIC TAGS: human physiology, space physiology, weightlessness, parabolic flight

ABSTRACT: Cosmonaut training flights in aircraft equipped with a weightlessness tank are described. Some physiological parameters of the trainees during various stages of the flight are discussed. One series of tests performed on a dynamometer showed that, compared to horizontal flights, during weightlessness the amount of maximum muscular force which can be exerted is reduced by 6—12 kg for the right hand and 4—12 kg for the left hand. This decrease in muscular force is probably connected with the decreased tonus of the skeletal muscles and functional changes in the central nervous system during weightlessness. The coordinograph, a device for measuring changes in fine coordination movements, recorded the total work time for each test, the number of errors, and the time of one movement. Although no disruption in coordination was observed when these tests were conducted during parabolic flight, most cosmonauts showed some lag in the speed of execution of motor acts. Orig. art. has: 2 figures. [JS]

SUB CODE: 06 SUBM DATE: none/
 Card 1/1

ACCESSION NR: AP4043538

8/0020/64/157/004/0816/0819

AUTHORS: Pankratov, S. A.; Khlebnikov, G. D.

TITLE: Concerning some characteristics of mechanical rupture of rocks under the action of static, impact, and cycling loads

SOURCE: AN SSSR. Doklady*, v. 157, no. 4, 1964, 816-819

TOPIC TAGS: mechanical rock crushing, static load, cyclic load, impact load, quartzite, intergranular strength, crystal strength

ABSTRACT: In order to investigate the processes instrumental in crushing of rocks, cubic quartzite specimens were prepared with 15 mm sides. They were subjected to static pressure in a press by a load of about 18 cm in diam. (the rupture stress was about 1000 kg), to impact (stresses were not measured), and to a cyclic load, with 400 kg maximum load; at 24 Hz, the rupture occurred in 1 to 5 min. Microscopic examination showed that the cracks at rupture were not intergranular, but cut through crystals more or less rectilinearly. In cyclic ruptures, sometimes intergranular cracks were observed. Tension stresses were also applied to specimens 0.05 mm

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ACCESSION NR: AP4043538

thick. In this case the cracks were intergranular. It is pointed out that in crushing, the compressing load increases the strength of the granular binding, and reduces the strength of the grains. Orig. art. has: 3 figures.

ASSOCIATION: None

SUBMITTED: 07Mar64

ENCL: 00

SUB CODE: ME, MT

NR REF SOV: 000

OTHER: 000

Card 2/2

S/865/62/002/000/025/042
D405/D301

AUTHORS: Kotovskaya, A.R., Lobashkov, S.I., Simpura, S.F.,
Suvorov, P.M. and Khlebnikov, G.F.

TITLE: Effect of prolonged transverse accelerations on
human organism

SOURCE: Problemy kosmicheskoy biologii. v. 2. Ed. by N. Sisa-
lyan and V. Yazdovskiy. Moscow, Izd-vo AN SSSR, 1962,
238-245

TEXT: The investigation had the following main objects:
to study the effect of prolonged transverse accelerations on the
principal physiological functions of the organism; to determine the
limits of endurance of acceleration; the selection of the optimal
position of the human body during acceleration; the development of
methods of training and selection for astronauts. Experimental meth-
od: A group of specially selected healthy persons aged 25-30 was
subjected to centrifuge tests. The response to accelerations of 7,
9, 10 and 12 g was investigated. The indicators of the following

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Effect of prolonged ...

S/365/62/002/000/025/042
D405/D301

basic physiological functions were recorded: electrocardiograms; arterial pressure; pulse and respiration rate; lung ventilation and gas exchange; electroencephalograms; electromyograms of thorax and peritoneal muscles; the duration of the latent period of motor response to light signals; the penetrability of cutaneous capillaries. Results: The subjects could sustain accelerations of 7-12 g for a period of 3 minutes to 30 seconds respectively. The external respiration underwent marked changes; the subjects experienced difficulties in breathing. The number of cardiac contractions increased. The arterial pressure also increased. Some regular changes in the bioelectric activity of the brain were noted; these changes can be divided into 3 main stages. The latent period of response to light signals increased to 0.8-0.9 seconds. The acuity of sight decreased in the majority of subjects by 20-30%. The bioelectric activity of the investigated muscles increased. All these physiological changes reverted to normal 3-5 minutes after the acceleration ceased. An analysis of the obtained material showed that the changes in the physiological functions are within tolerable limits, being determined by the magnitude and duration of the overload. Cutaneous hemorrhages

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Effect of prolonged ...

S/365/62/002/000/025/042
D405/D301

were observed in most of the subjects after the acceleration ceased. The optimal position of the body was found to be a 10° inclination of the back of the chair with respect to the horizontal. The experiments made it possible to divide the subjects into 3 groups with regard to endurance: those with high endurance, satisfactory endurance, and low endurance. The obtained results were used in developing a special training program for the astronauts Yu. A. Gagarin and G.S. Titov. There are 2 figures and 4 tables.

Card 3/3

1. 00109-67 FSS-2/INT(1)/NSC(1)-2 SCTR TP/DM/GN/GW
ACC NR: AT6036480 SOURCE CODE: UR/0000/66/000/000/0034/0036

AUTHOR: Arzhanov, I. M.; Beregovkin, A. V.; Bryanov, I. I.; Buyanov, P. V.;
Zaloguyev, S. N.; Kamen'shchikov, Yu. V.; Kovalov, V. V.; Krasovskiy, A. S.;
Kuznetsov, S. V.; Litsov, A. N.; Nikitin, A. V.; Nistratov, V. V.; Poruchikov, Ye. A.;
Potkin, V. Ye.; Teret'yev, V. G.; Fejorov, Ye. A.; Khlebnikov, G. F.;
Yaroshenko, G. L.

ORG: none

TITLE: Results of clinical and physiological investigations of the crew of the
first multiman Voskhod spacecraft [Paper presented at the Conference on Problems of
Space Medicine held in Moscow from 24 to 27 May 1966]
SOURCE: Konferentsiya po problemam kosmicheskoy meditsiny, 1966. Problemy
kosmicheskoy meditsiny. (Problems of space medicine); materialy konferentsii,
Moscow, 1966, 34-36

TOPIC TAGS: space medicine, space physiology, weightlessness, bodily fatigue,
stress reaction, combined stress, cardiovascular system, central nervous system,
manned spaceflight/Voskhod-1

ABSTRACT: The inclusion of a physician in the crew of the Voskhod-1 made it pos-
sible to increase medical investigations of the crew members during
flight and to compare them with results of preflight and postflight exami-
nations. The scope of the physiological examinations was selected in
order to obtain a more complete evaluation of the functional condition of
the cardiovascular and central nervous systems, and the function of

Card 1/4

L 08269-67

ACC NR: AT6036480

external respiration of the cosmonauts. Physical exercises and ortho-static tests were included to detect earlier signs of physiological shifts.

Examinations were carried out before and after training in the ship, where certain conditions of flight were simulated, and also two weeks before flight. Postflight examination was begun fifteen minutes after landing and was continued for the first four days after the flight and also two weeks later.

After landing, the cosmonauts were active, looked somewhat excited, and complained of general fatigue. They were found to have hyperemia of the mucosa of the upper respiratory tract and conjunctivitis.

Komarov's weight dropped by 2.6%, Feoktistov's weight dropped by 4%, and Yegorov's by 3.9%. Weight loss was determined by Zhdanov to be due to water and fat loss. Neurological examination revealed a light swaying in the Romberg position, a tremor of the fingers, and increased perspiration. In addition, Yegorov showed a contraction of the retinal arteries. Disruption of vision and vestibular difficulties were not noted. Changes in EEG indicated an increase in inhibitory processes in the cortex of the brain. A diminution in work capacity was established by

Card 2/4

1. 000000-07
ACC NR: AT6036480

psychological experiments (increase in the number of mistakes, increase in latent periods). D

Indices of cardiovascular activity during rest did not exceed wide norms. However, an increase in pulse frequency was noted (Komarov up to 96, Feoktistov up to 100, and Yegorov up to 94 beats/min), as well as moderate drop in arterial pulse pressure at the expense of an increase in diastolic pressure. All three cosmonauts, when subjected to exercise, showed a significant increase in the pulse rate and inertia in the stroke volume. Feoktistov and Yegorov showed a significant diminution in the heart stroke volume and minute circulation of the blood during the passive orthostatic test. This could indicate a disruption of the venous inflow to the heart.

Postflight blood examinations indicated neutrophilic leukocytosis and eosinopenia. Urine was found to contain significant quantities of salts, chiefly urates, single erythrocytes (in the field of vision), and an increase in the excretion of 17-oxycorticosteroids. Eosinopenia, an increase in excretion of products of hormone decomposition, indicated the development of a stress reaction in cosmonauts. Since some of the indications found on the flight were also found after training in the train-

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L 08269-67

ACC NR: AT6036480

ing ship, there is reason to attribute them to limitation of motor activity under conditions of weightlessness. The functional shifts found after flight are indications of a general fatigue, a moderate stress reaction, and a certain amount of detraining. In general, the changes observed in the cosmonauts were of one type. The differences found between the cosmonauts can be attributed to individual differences. [W.A. No. 22; ATD Report 66-116]

SUB CODE: 06, 22 / SUBM DATE: 00May66

Card 4/4 *eyh*

L 08345-67 EWT(1) SCTB DD/RD/OD

ACC NR: A16036667

SOURCE CODE: UR/0000/66/000/000/0355/0356

AUTHOR: Surinov, Yu. A.; Khlebnikov, G. F.

ORG: none

35

TITLE: Principles of the physical training of cosmonauts [Paper presented at the Conference on Problems of Space Medicine held in Moscow from 24-27 May 1966]

SOURCE: Konferentsiya po problemam kosmicheskoy meditsiny, 1966. Problemy kosmicheskoy meditsiny. (Problems of space medicine); materialy konferentsii, Moscow, 1966, 355-356

TOPIC TAGS: cosmonaut training, cosmonaut selection, physical exercise, space physiology, space psychology

ABSTRACT:

The physical training of cosmonauts is accomplished in two ways:
1) general physical training program to develop qualities of strength, speed, skill, endurance, and improved coordination of movements, etc;
2) special (mission oriented) physical training to increase the resistance of the organism to accelerations and vestibular analyzer irritation, etc.

Cord 1/3

L 08845-67

ACC NR: AT6036667

The forms of cosmonaut physical training are: 1) morning physical drills; 2) educational-training (planning) courses; 3) group-sport activity; 4) physical-training courses during duty periods; 5) physical-training courses during regular breaks; 6) physical exercises during spaceflight. Morning physical exercises are conducted daily for 20-40 min. Educational-training courses are the basic form of physical training and are conducted three-to five times per week. The duration of each course is two hr. Group sport activity involves an elected sport and participation in sports competitions. A physical-training course during duty periods is conducted to maintain the level of training. During regular breaks, physical training is conducted as a means of recreation. Physical exercises during spaceflight are a means of maintaining a high work capacity level.

The entire program of physical training is divided into three stages: 1) elementary instruction to increase the level of general physical condition and to build the foundations of specialized training programs; 2) maintaining a level of general preparedness and increasing specialized conditioning; 3) direct preparation for spaceflight to attain a high level of

Card 2/3

L 08845-67

ACC NR: AT6036667

APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000722030001-6
general physical preparedness and conditioning.

Rating the level of specialized physical preparedness and conditioning is conducted by means of sports and technical indices of strength, endurance, speed, and the ability to conduct complex coordinated exercises on special training devices. The existing system of physical training for cosmonauts has been successful for spaceflights of up to five days. [W. A. No. 22; ATD Report 66-116]

SUB CODE: 06,22 / SUBM DATE: 00May66

Card 3/3

L 10970-67

FSS-2/BWT(1)

TD/OD

ACC NR: AT6036587

L 10970-67

ACC NR: AT6036587

The methodological approach consisted of a modified Barani rotational test (10 rotations for 10 sec) during horizontal flight in a jet aircraft and during conditions of weightlessness (25 sec). During the first stage, the rotational test was conducted during the five sec after the beginning of stabilized weightlessness. In the second stage, the same people were rotated at the beginning of the transition period from 2 G to 0 G for 5 sec and then for an additional 5 sec during the beginning of weightlessness.

Examinations were conducted on male subjects aged 23—45 with high vestibular resistance to motion sickness under terrestrial conditions and high tolerance of weightlessness during flights.

Three basic components of the vestibular analyzer were studied:

1. somatic (duration of postnystagmus)
2. autonomic (pulse rate, perspiration, skin color)
3. sensory (subjective illusions, illusions of counterrotation).

It was revealed that 18.2% of the subjects had latent forms of motion sickness during rotational tests under conditions of stabilized weightlessness. In this group, the duration of counterrotational illusion was prolonged, as was postrotational nystagmus by 2—5 sec compared to horizontal flight

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ACC NR: AT6036587

data, paleness or redness of facial skin was apparent, and moderate hyperhidrosis was noted as were illusions of changed body position with the eyes closed. Increased salivation and worsened subjective feelings were also noted.

Vestibulo-autonomic discomfort was not observed in the remainder of subjects. The duration of counterrotational illusion and postrotational nystagmus was shortened by 4—6 sec in the majority of subjects, while in others these indices were not shortened.

At the beginning of rotation in the period of transition from positive G to weightlessness during the second stage, tolerance of angular accelerations during stabilized weightlessness revealed 22.2% more cases of latent motion sickness. In these subjects, the duration of counterrotational illusions increased as compared to their duration during stabilized weightlessness; pronounced paleness of facial skin, lip cyanosis, pronounced, general hyperhidrosis, nausea, hypersalivation, and discomfort in the area of the stomach were observed. The termination of nystagmus could not be fixed relative to the onset of accelerations following weightlessness.

In the opinion of the authors, symptoms of motion sickness during ro-

Card 3/4

L 10970-67

ACC NR: AT6036587

tational tests under conditions of stabilized weightlessness were found for the following reasons: first, under conditions of weightlessness the function of the otolithic component of the vestibular apparatus was modified due to the unusual position of the otoliths (floating state) which led to increased sensitivity to angular accelerations during rotation of the chair; second, manifestations of Coriolis accelerations as a result of Barani chair rotation during parabolic flight.

In those cases when the rotational test was completed in the period of transition from acceleration to weightlessness, additional adequate irritation of the otoliths associated with a sharp switch from a "plus" stimulus to a "minus" took place, facilitating the more rapid accumulation of Coriolis accelerations.

Therefore, the use of a modified rotational test under short-term weightlessness conditions reveals latent forms of motion sickness even in people with high resistance and can be used for prognostic purposes.

Use of the rotational test in the period of transition from acceleration to weightlessness reveals latent forms of motion sickness most effectively.

[W.A. No. 22; ATD Report 66-116]
SUB CODE: 06 / SUBM DATE: 00May66

L 8905-65 EMG(j)/EMG(r)/EMT(1)/PS(v)-3/EMG(v)/EMG(a)/EMG(c) Ps-5/Pb-4/Pa-4
 AFTC(b)/RAEM(t)/AFETH/AMU DD/MD
 ACCESSION NR: AP4046056

8/0245/64/000/005/0003/0010

AUTHOR: Khlebnikov, G. F. (Moscow); Lebedev, V. I. (Moscow) B

TITLE: Dynamics of emotional and volitional processes in cosmonauts during parachute jumps

SOURCE: Voprosy* psikhologii, no. 5, 1964, 3-10

TOPIC TAGS: cosmonaut training, parachute jump, simulated space-flight, emotion, defensive reflex, fear, sympathetic tonus, parasympathetic tonus, physiological stress, psychological stress

ABSTRACT: Observations of cosmonauts during jump training included pulse rate and dynamometry of hand grips, which shed light on modifications to the initial emotional stress reactions which occurred as training progressed. In the first days of jumping, the pulse rate on enplaning and just before the jump increased to as much as 120 to 140 beats/min. Simultaneously, other signs of an asthenic fear reaction (passive-defensive reflex) were observed. Grip strength (from a hand dynamometer) increased significantly in almost all cases in the first days of jumping. The registered increase in these indices just before

Card 1/2

L 8905-65

ACCESSION NR: AP4066056

jumping fell off gradually as training progressed, finally almost returning to initial levels. The second stage of training (more complicated jumps, e. g., at night, over water, in flight gear) was marked by a moderate redistribution of autonomic reactions due to gain in sympathetic nervous tone. This state, which is identical to that normal to trained parachutists just before complex jumps, is characterized by the disappearance of oculocardiac reflexes, a noticeable increase in pulse rate during orthostatic tests, and a change in the galvanic skin response. Parachute jumping increases the excitability of the autonomic nervous system, reinforcing sympathetic tone before the jump and parasympathetic tone afterwards. By strengthening the volitional control of the autonomic nervous system, the conscious control of behavior jump training overcomes the emotional reaction to danger.

ASSOCIATION: 150

SUBMITTED: 00

SUB CODE: 00

Card 2/2

RIGHT: 00

LEFT: 00

L 21548-66		EWT(1)/VSS-2/EC(A)-2/EWA(d)		SCTB	TT/DD/GW
ACC NR: AP6007746		SOURCE CODE: UR/0291/66/004/001/0151/0155			
AUTHOR: Buyanov, P. V.; Kovalev, V. V.; Terent'yev, V. B.; Fedorov, Ye. A. 36					
Khlebnikov, G. F.					
ORG: none					
TITLE: Results of preflight and postflight medical examinations of Voskhod-1 crew members 12					
SOURCE: Kosmicheskiye issledovaniya, n. 4, no. 1, 1966, 151-155 2					
TOPIC TAGS: cosmonaut, physiological change, cardiovascular system, enzyme, encephalogram, muscular tonus, leukocyte/vasodilator					
ABSTRACT: Results of preflight and postflight examinations of the Voskhod-1 cosmonauts were compared and physiological shifts were noted. The physiological profile of each cosmonaut was determined from background data compiled for two weeks before the flight. Examination of the cosmonauts after preflight training showed increased resistance to flight factors in all of them, especially Komarov. By comparison, Feoktistov and Yegorov showed less adaptability, especially in the cardiovascular system. In the week preceding the flight, Komarov and Feoktistov were somewhat reserved in behavior. Prelaunch tests conducted at the cosmodrome emphasized the nervous and emotional state of the cosmonauts. The four-day postflight medical examination began 15 minutes after landing. To ensure uniformity, all postflight tests					
Card 1/2		UDC: 629.198.61			

ACC NR: AP6007746

(including laboratory tests) were conducted by the same people who had performed the preflight checks. Clinical investigation begun six hours after landing showed a moderate decrease in working capacity, revealed in an increase in the number of errors and a lengthening of latent periods during performance of psychological tests. Encephalograms showed intensification of retardation processes in the cerebral cortex. Slight variations in digestive enzyme activity were also observed in the cosmonauts after the flight: the activity of amylase, enterokinase, alkaline phosphatase, and trypsin increased. The following shifts were noted in cosmonauts immediately after the flight: slight instability in the Romberg position, tremor of fingers, increased tendency to perspire, moderate decrease in muscle tone, quickening of the pulse, and decrease in blood pressure due to increased diastolic pressure. Body weight decreased 2.6% for Koamrov, 4% for Feoktistov, and 3.9% for Yegorov. In addition, moderate shifts in metabolic processes were noted: increased energy consumption while resting, increase in blood urea and cholesterol, and increased elimination of nitrogenous components from urine. Some decrease in the phagocytic activity of leukocytes was also observed. The changes noted were attributed to fatigue and stress. They were of a strictly functional nature and usually disappeared within several days after the flight. Individual characteristics and differences in pre-flight preparation were reflected in the varying character of these physiological shifts.

[JS]

SUB CODE: 06/ SUBM DATE: 28Jul65/ ATD PRESS: 4219

Card 2/2 BLG

L 22873-66 FSS-2/ENT(1)/EEC(k)-2/EWA(d) TT/RD/GW

ACC NR: AP6012836

SOURCE CODE: UR/0293/66/004/002/0311/0319

AUTHOR: Akulinichev, I. T.; Antoshchenko, A. S.; Znachko, V. A.;
Ivanov, A. Ye.; Lebedev, V. I.; Maksimov, D. G.; Uglov, A. Ye.;
Khlebnikov, G. G.

ORG: none

TITLE: Some results of monitoring the medical condition of P. I. Belyayev and A. A. Leonov during training and during orbital flight

SOURCE: Kosmicheskaya issledovaniya, v. 4, no. 2, 1966, 311-319

TOPIC TAGS: manned spaceflight, cosmonaut training, pressure chamber, human physiology, EVA / Voskhod-2

ABSTRACT: Training data for Leonov and Belyayev were compared with data from the Voskhod-2 flight. The cosmonauts were trained for rarefied atmosphere conditions by sequential exposure to pressure chamber altitudes of 5, 10, and 32-37 km. At an altitude of 5 km, neither cosmonaut required high altitude equipment or supplementary oxygen. At an altitude of 10 km, they breathed pure oxygen. In a rarefied atmosphere of 32-37 km, the cosmonauts wore suits analogous to those used on the Voskhod-2 flight. Flight system sensors and a stationary electrophysiological recorder were used. Pulse rate,

Card 1/8

UDC: 629.198.61

L 22873-66

ACC NR: AP6012836

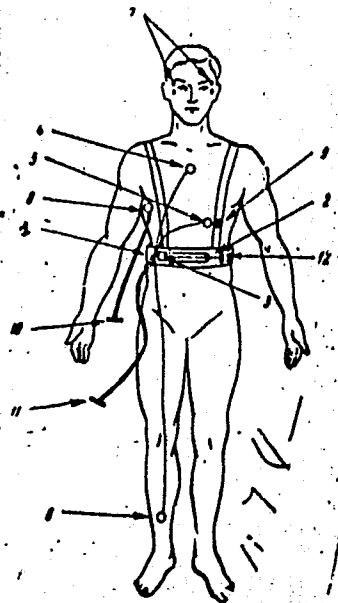


Fig. 1. Position of physiological sensors on the cosmonaut.

1 - Individual system of electrode and sensor positioning; 2 - ohmic respiration sensor; 3 - contact respiration sensor; 4, 5 - EKG electrodes; 6 - ground; 7 - EOG electrodes; 8 - body temperature sensor (submuscular area, Leonov only); 9 - SCG sensor; 10, 11 - detachable terminals; 12 - lacing.

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L 22873-66

ACC NR: AP6012836

Table 1. Changes in some physiological indexes of Belyayev and Leonov during space suit tests at 36 km

Index	Belyayev			Leonov		
	Before	36 km	After	Before	36 km	After
Pulse rate, min.	12	9-18	12-28	16	12-18	12
Resp. rate, min.	67	60-67	62	63	67-68	57
P-Q, sec.	0,20	0,16-0,20	0,18	0,12	0,12-0,14	0,12
QRS, sec.	0,10	0,08-0,10	0,10	0,08	0,08-0,08	0,08
QRST, sec.	0,40	0,40	0,40	0,32	0,32-0,36	0,36
Systolic Index, %	42	40-42	40	33	33-41	36
P, mm	1	1	1	1	0,5-0,6	Weak
R, mm	9	11	8	22	19-23	15
S, mm	0,5	Weak	0,5	0,5	4	2
T, mm	5	3-4	3	6	4-6,5	3,5

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L 22873-66

ACC NR: AP6012836

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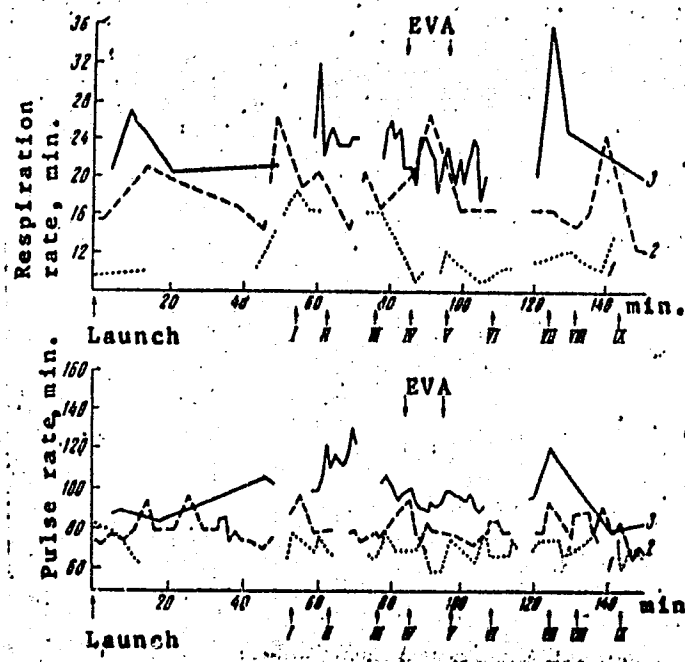
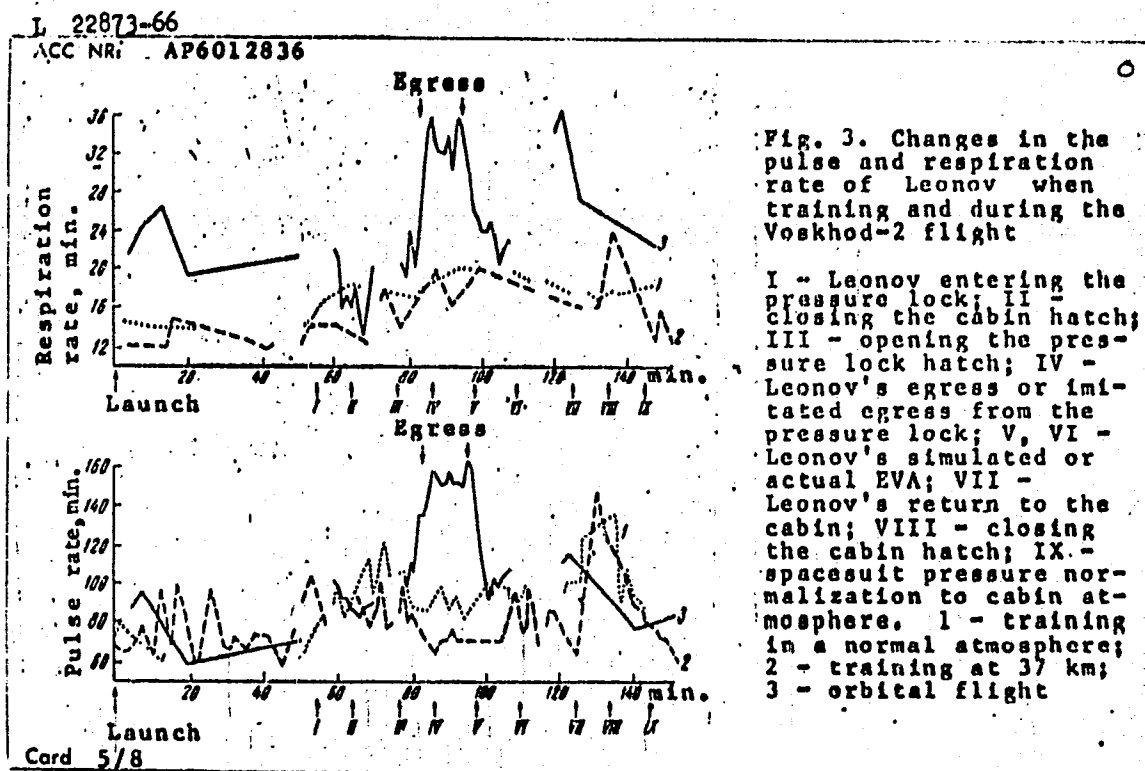


Fig. 2. Changes in the pulse and respiration rate of Belyayev when training and during the Voskhod-2 flight

I - Leonov entering the pressure lock; II - closing the cabin hatch; III - opening the pressure lock hatch; IV - Leonov's egress or imitated egress from the pressure lock; V, VI - Leonov's simulated or actual EVA; VII - Leonov's return to the cabin; VIII - closing the cabin hatch; IX - spacesuit pressure normalization to cabin atmosphere. 1 - training in a normal atmosphere; 2 - training at 37 km; 3 - orbital flight

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L 22873-66

ACC NR: AP6012836

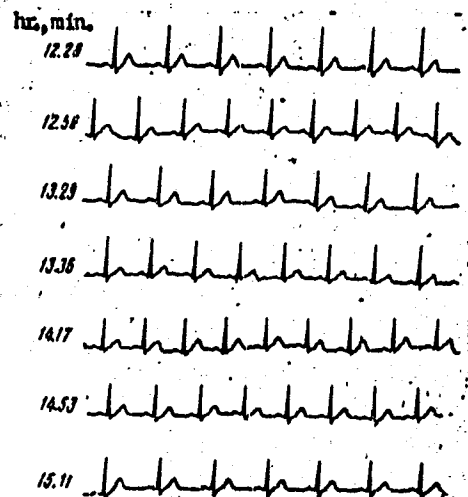


Fig. 4. Belyayev's EKG's when rehearsing the flight program in the spacecraft mockup (exercise no. 2, 37 km)

12.26 - normal condition; 12.56 - instrument check; 13.29 - prior to Leonov's entrance into the pressure lock; 13.36 - opening the cabin hatch; 14.17 - imitation of the egress; 14.53 - Leonov's return to the cabin; 15.11 - after the egress program and normalization of suit pressure

Card 6/8

L 22873-66

ACC NR: AP6012836

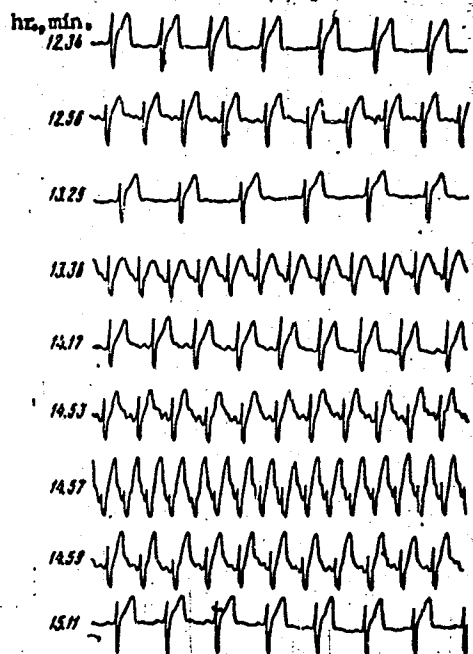


Fig. 5. Leonov's EKG's when rehearsing the flight program in the spacecraft mockup (exercise no. 2, 37 km)

12.34 - normal condition; 12.56 - instrument check; 13.29 - prior to entering the pressure lock; 13.36 - opening the cabin hatch; 14.17 - imitation of egress; 14.53 - return to the cabin; 14.57 - closing the cabin hatch; 14.59 - instrument check; 15.11 - after returning to the seat and normalizing suit pressure

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L 22873-66

ACC NR: AP6012836

respiration rate, and EKG's were recorded along with visual (TV) observations. Two-way radio communication was maintained. A space-craft mockup was used to test two series of exercises. In the first exercise, the cosmonauts rehearsed the program involving the movement of Leonov into the pressure lock under normal atmospheric conditions. The second exercise entailed the same regimen at an altitude of 37 km. A diagram of the sensors used is shown in Fig. 1. Results of the tests are given in Figs. 2-5 and Table 1. All Voskhod-2 systems and the newly designed suit used for Leonov's EVA functioned normally both during the training program and the flight itself. During training and the Voskhod-2 flight, the pressurization and egress program caused accelerated pulse and respiration rates and functional EKG variations in both cosmonauts. These were attributed to emotional stress, and in Leonov's case, physical strain. The training program was judged to be fully applicable to the Voskhod-2 program. Orig. art. has: 1 table and 5 figures.

[CD]

SUB CODE: 05, 06/ SUBM DATE: 01Nov65/ ORIG REF: 006/ ATD PRESS:

4234

Card 8/8 LC

VOLYNKIN, Yu.M.; ARUTYUNOV, G.A.; ANTIPOV, V.V.; ALTUKHOV, G.V.;
 BAYEVSKIY, R.M.; BELAY, V.Ye.; BUYANOV, P.V.; BRYANOV, I.I.;
 VASIL'YEV, P.V.; VOLOVICH, V.G.; GAGARIN, Yu.A.; GENIN, A.M.;
 GORBOV, F.D.; GORSHKOV, A.I.; GUROVSKIY, N.N.; YESHANOV, N.Kh.;
 YEGOROV, A.D.; KARPOV, Ye.A.; KOVALEV, V.V.; KOLOSOV, I.A.;
 KORESHKOV, A.A.; KAS'YAN, I.I.; KOTOVSKAYA, A.R.; KALIBERDIN,
 G.V.; KOPANEV, V.I.; KUZ'MINOV, A.P.; KAKURIN, L.I.; KUDROVA,
 R.V.; LEBEDEV, V.I.; LEBEDEV, A.A.; LOBZIN, P.P.; MAKSIMOV,
 D.G.; MYASNIKOV, V.I.; MALYSHKIN, Ye.G.; NEUMYVAKIN, I.P.;
 ONISHCHENKO, V.F.; POPOV, I.G.; PORUCHIKOV, Ye.P.; SIL'VESTROV,
 M.M.; SERYAPIN, A.D.; SAKSONOV, P.P.; TERENT'YEV, V.G.; USHAKOV,
 A.S.; UDALOV, Yu.F.; FOMIN, V.S.; FOMIN, A.G.; KHLEBNIKOV, G.F.;
 YUGANOV, Ye.M.; YAZDOVSKIY, V.I.; KRICHAGIN, V.I.; AKULINICHEV,
 I.T.; SAVINICH, F.K.; STMPURA, S.F.; VOSKRESENSKIY, O.G.;
 GAZENKO, O.G.; ~~SISAKYAN~~, N.M., akademik, red.

[Second group space flight and some results of the Soviet
 astronauts' flights on "Vostok" ships; scientific results of
 medical and biological research conducted during the second
 group space flight] Vtoroi gruppovoi kosmicheskii polet i neko-
 torye itogi poletov sovetskikh kosmonavtov na korabliakh
 "Vostok"; nauchnye rezul'taty medikobiologicheskikh issledovani,
 provedennykh vo vremia vtorogo gruppovogo kosmicheskogo poleta.
 Moskva, Nauka, 1965. 277 p. (MIRA 18:6)

AUTHORS: Khlebnikov, G.I., Dergunov, Ye.P. 89-4-4-12/28

TITLE: The Production of Solid Uranium-, Neptunium-, Plutonium- and Americium-Layers by the Electrolytic Depositing Method
(Polucheniye prochnykh sloev urana, neptuniya, plutoniya i ameritsiya metodom elektroliticheskogo osazhdeniya)

PERIODICAL: Atomnaya Energiya, 1958, Vol. 4, Nr 4, pp. 376-377 (USSR)

ABSTRACT: The electrolytic depositing method was employed for the production of the layers. In order to improve their strength a complex former is added to the electrolyte, viz. ammonium oxalate (dissolved in water: 0.05 to 0.07 M) or formic acid. For a target with 0.5 x 1.2 cm and a thickness of layers of 0.15 - 0.25 mg/cm² 0.5 - 2.0 cm³ ammonium oxalate is poured into the electrolyzing vessel. The distance between the electrodes is from 1.5 to 2.0 cm. Next, ~ 0.2 cm³ nitric acid- or hydrochloric acid solutions of the element to be electrolyzed (U⁺⁶, Np⁺⁴, Pu⁺⁴) is added accompanied by vigorous stirring. By the addition of concentrated NH₄OH the pH-value of 8-9 is attained.

Card 1/2

The Production of Solid Uranium-, Neptunium-, Plutonium-
and Americium-Layers by the Electrolytic Depositing Method

89-4-4-12/28

Electrolysis takes place at room temperatures and a cathode current density of 100-150 mA/cm². After electrolysis has been completed the electrolyte is removed by a pipet and the foil is washed with distilled water containing no CO₂ (with the addition of some ammonia), after which it is dried for 2 to 3 hours in the air at room temperature. The anodes were of platinum, graphite, or nickel. For the production of americium foils Am must be dissolved in 0.2 M formic acid and 0.2 M formic acid ammonium. There are 8 references, 3 of which are Soviet.

SUBMITTED: November 21, 1957

- | | |
|---------------------------------|---------------------------------|
| 1. Americium--Electrodeposition | 2. Neptunium--Electrodeposition |
| 3. Plutonium--Electrodeposition | 4. Uranium--Electrodeposition |
| 5. Thin films--Preparation | |

Card 2/2

AUTHORS: Kartushova, R. Ye., Rudenko, T. I., Fomin, V. V. SOV/89-5-1-2/28

TITLE: The Thermal Dissociation of the Oxalates of Quadrivalent and Trivalent Plutonium (Termicheskoye razlozheniye oksalator ohetyrehvalentnogo i trekhvalentnogo plutoniya)

PERIODICAL: Atomnaya energiya, 1958, Vol. 5, Nr 1, pp. 24-28 (USSR)

ABSTRACT: By means of a recording pyrometer developed by Kurnakov, the process of thermal dissociation (pyrolysis) of various types of plutonium was investigated. The state of intermediate products was determined in the Berg type gas pyrette, by potentiometric titration as well as by the method developed by Penfield (Penfil'd). It was found that the freshly precipitated oxalate of Pu (IV) loses 3 molecules of water at 100° C. From oxalates which had been stored for 3-4 days 1,5 to 2,7% CO+CO₂ are in addition separated at 100° C as a result of dissociation caused by the effect of the plutonium α-rays. At the same time partial reduction to trivalent plutonium takes place. Within the temperature range of from 170-200° C 2 molecules of water and 13% CO+CO₂ are, in addition, separated. The plutonium is reduced to the trivalent state mainly by the formation of Pu₂(C₂O₄)₃·H₂O.

Card 1/2

The Thermal Dissociation of the Oxalates of Quadrivalent
and Trivalent Plutonium

SOV/89-5-1-2/28

At 380° C the oxalate is transformed into plutonium dioxide. At 440° C the oxalate of Pu (III) is completely freed from water and goes over into plutonium oxide at 270° C in the air. In an inert medium dissociation of the oxalate takes place at 330° C accompanied by the formation of an oxalate carbonate. At 460° C the oxalate carbonate is dissociated and the trivalent plutonium is oxidized to quadrivalent plutonium, while, at the same time, a dioxide is formed. There are 4 figures, 4 tables, and 6 references, 2 of which are Soviet.

SUBMITTED: December 14, 1957

1. Plutonium--Decomposition
2. Plutonium oxylates--Chemical reactions
3. Titration--Applications
4. Gamma rays--Performance

Card 2/2

FLEROV, G. N., POLIKANOV, S. M., KARAMYAN, A. Z., PASYUK, A. S., PARFANOVICH, D. M.
TARANTIN, N. I., KARNAUKHOV, V. A., DRUIN, V. A., VOLKOV, V. V., SEMCHINOVA, A. M.,
OGANESYAN, Yu. Ts., KHALIZEV, V. I. and KHLEBNIKOV, G. I.

"Experiments to Obtain Element 102." Dokl. Akad. Nauk SSSR, Vol. 120, No. 1, 73-5 (1958). In Russian.

Plutonium isotopes Pu^{239} and Pu^{241} were irradiated with oxygen ions, accelerated to 102 MeV. The nucleus so produced leaves the target, because of recoil, and is picked up in a collector. This can be moved, in a time of 4-5 sec, over to nuclear emulsions which are designed to register α -particles. Alpha-particles of energy greater than 8.5 MeV are detected. These could come from $Pu^{239,241}$, ($O^{16}, 4-6n$) $102^{27,253}$. The total number of α -particles with an energy exceeding 8.5 MeV (those of energy less than 7 MeV could come from platinum contamination) was 18 in the irradiation of Pu^{239} and 8 in the case of Pu^{241} . These figures would give cross-sections for formation of element 102 of 2×10^{-31} and 5×10^{-32} cm², respectively.

G. E. Brown

21(7)

AUTHORS:

Tret'yakov, Ye. F.,

SOV/56-36-2-3/63

Kondrat'yev, L. N., Khlebnikov, G. I., Gol'din, L. L.

TITLE:

The Spectrum of Internal Conversion Electrons Accompanying
 α -Decay of Pu^{238} and Pu^{240} (Spektr elektronov vnutrenney
konversii, soprovozhdayushchikh α -raspad Pu^{238} i Pu^{240})

PERIODICAL:

Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959,
Vol 36, Nr 2, pp 362-366 (USSR)

ABSTRACT:

The investigation of the decay of even-even nonspherical nuclei
and of the energy of excited levels, especially the α -decay of
 Pu^{238} and Pu^{240} , is of very great theoretical importance.
Investigation of the α -decay of these nuclei and of the levels
of daughter nuclei occurring in this decay is carried out either
by the α -spectrometry method, by that of γ - γ coincidence, or,
as in the present paper, by the analysis of the conversion
electron spectrum accompanying this decay. Measurements were
carried out by means of a β -spectrometer with toroidal magnetic
field and α -e-coincidence circuit. The method has already been
described (Refs 1, 2). Scintillation counters with stilbene

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The Spectrum of Internal Conversion Electrons
Accompanying α -Decay of Pu^{238} and Pu^{240}

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crystals were used for β -counting. Electron energy was determined by comparison with the conversion electron energy of the transitions $2+ \rightarrow 0+$ (43.5 kev) and $4+ \rightarrow 2+$ (99.8 kev) in U^{234} , the daughter nucleus of Pu^{238} . (These exact data were obtained by Perlman (Perelman)(Ref 3)). For the investigation of the conversion electron spectrum occurring in the α -decay of Pu^{238} which therefore supplies data concerning the level of U^{234} , a source with 1 cm diameter and an intensity of $40 \mu\text{C}$ was used. The results obtained by the investigation are shown by figure 1 (course of the spectrum with assignation of individual peaks), figure 2 (scheme of U^{234} -levels: 499 kev(8+), 295.9 kev(6+), 143.3 kev(4+), 43.5 kev(2+), containing data from references 3 and 4), and by table 1 (energy of U^{234} -levels and intensity of α -lines of Pu^{238} , containing data from references 3, 4, 5). For the investigation of the conversion spectrum of Pu^{240}

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Accompanying α -Decay of Pu^{238} and Pu^{240}

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a source of only $5\mu\text{C}$ was used, and the spectrum was investigated within the range of 20 -220 kev. Figure 3 again shows the spectrum, figure 4 the level scheme of U^{236} (daughter nucleus of Pu^{240}): 309 kev (6+), 239 kev (3?), 210 kev (1?), 148.9 kev (4+), 45.3 kev (2+). The lines with (?) are from reference 5, but were also observed by Kondrat'yev et al. (Ref 6). Table 2 shows the intensities of the α -lines (Pu^{240}) and the energies of the U^{236} -levels in comparison with the results obtained by other authors (Refs 3, 6, 7). The authors finally thank G. I. Grishuk, V. F. Konyayev and Yu. N. Chernov for helping to carry out experiments. There are 4 figures, 2 tables, and 7 references, 5 of which are Soviet.

SUBMITTED: June 14, 1958

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S/120/60/000/006/016/045

E032/E314

26.1640

AUTHORS: Ponomarev, A.A., Khlebnikov, G.I. and
Gavrilov, K.A.

TITLE: A Method for Controlling the Electrodeposition of
 α -active Isotopes

PERIODICAL: Priory i tekhnika eksperimenta, 1960, No. 6,
pp. 58 - 60

TEXT: A simple method of continuous control of the electro-
deposition of α -active isotopes, which involves the use of
standard scintillation counters and standard electronics, is
described. The apparatus is shown schematically in Fig. 1.
The cathode 2, on which the active substance is deposited,
was in the form of a nickel foil, 1.5 to 5 μ thick. The area
of the target was $5 \times 10 \text{ mm}^2$. The material is deposited from
the electrolyte 1 and the α -particles transmitted by the
cathode produced scintillations in the ZnS phosphor 4.
The scintillations reached the photomultiplier through the
light pipe 5 and the output of the photomultiplier was
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recorded by a "standard block Π C-10 000 (PS-10 000)". The thickness of the cathode was chosen so that it would transmit α -particles and to ensure that the scintillations would give rise to photomultiplier pulses much greater than the dark current. The electrolytic device, which is attached to the apparatus, was of the type described by Yakovlev et al (Ref. 13). The above apparatus was used to investigate the effect of:

- a) the concentration of the electrolyte (0.1 - 1 mol /litre);
 - b) the current density at the cathode (10 - 300 mA/cm²) and
 - c) concentration of the deposited substance (20 - 100 μ g/cm²)
- on the amount and quality of the deposit in the case of the electrodeposition of Pu²³⁹ from a water solution of H₂CO₂ and NH₄CO₂H. The results obtained are summarised in Figs. 2 and 3. Fig. 2 shows the dependence of the amount of plutonium
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produced (%) as a function of the concentration of the electrolyte (mol/litre). The points marked 1 refer to the present method and the points marked 2 refer to the direct α -particle counting after electrolysis. Fig. 4 shows the dependence of the amount of plutonium deposited on the cathode current density and Curve 3 shows the counting rate₂ as a function of time for $C = 0.25$ mol/litre and $I_k = 150$ mA/cm². It was found that the best plutonium deposits were obtained with a concentration of 0.25 mol/litre and a current density at the cathode of 100-200 mA/cm². Under these conditions, an 80-90% yield of plutonium was achieved. With small modifications the apparatus can also be used to investigate the deposition of α -active specimens by vacuum and electrostatic methods. Acknowledgments are expressed to G.N. Olerov for valuable advice and suggestions and to V.A. Druin for assistance in the present work.

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Isotopes

There are 4 figures and 13 references: 7 Soviet, 6 English.

SUBMITTED: September 29, 1959

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85565

21.1330
26.2231

S/089/60/009/005/009/020
B006/B070

AUTHORS: Khlebnikov, G. I., Dergunov, Ye. P. (Deceased)

TITLE: Preparation of Thick Layers of [✓]Thorium, [✓]Uranium,
[✓]Neptunium, [✓]Plutonium, and [✓]Americium

PERIODICAL: Atomnaya energiya, 1960, Vol. 9, No. 5, pp. 406 - 408

TEXT: Several methods are described in this "Letter to the Editor" for the preparation of thick layers of heavy elements. These methods were successfully used by the authors. 1) The electrolytic method. By repeated electrolytic depositing[✓] on the same base it was possible to obtain layers of a thickness of 1 mg/cm² and more. Layers of Th²³⁰ and ionium were prepared by an ordinary electrolytic device (cathode: aluminum foil, 50 μ thick; anode: spiral of platinum wire, 0.5-1 mm; electrode spacing, 2.5-3 cm). Thorium nitrate was dissolved in distilled water, and the solution was diluted with 96% ethyl alcohol. 60 cm³ of this was used for electrolysis. The effects of current density on the cathode, of the concentration of the thorium nitrate, and

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Preparation of Thick Layers of Thorium, S/089/60/009/005/009/020
Uranium, Neptunium, Plutonium, and BO06/BO70
Americium

of the duration of electrolysis on the quantity Q of thorium deposit (ThO_2) were studied. Fig.1 shows Q as a function of time for different current densities; the curves have a steep rise but show a quick saturation. It was further found that for the same concentration the greater the current density, the more rapidly is saturation reached. Fig. 2 shows $Q(t)$ for different concentrations of thorium nitrate, current density remaining constant. It was found that the greater the concentration, the more rapid is the increase of Q and the later is the saturation. Similar experiments were performed with Np^{237} , and by repeated depositings layers of $1-1.5 \text{ mg/cm}^2$ were obtained. 2) Mechanical depositing by addition of organic substances. Layer thicknesses of $1-4 \text{ mg/cm}^2$ of uranium, thorium, neptunium, plutonium, and americium were obtained on aluminum or platinum bases. The layers were applied repeatedly in the form of laquers by means of a glass capillary. The preparation of the laquers is described. 3) The electrochemical method. U_3O_8 layers of a thickness of $1-8 \text{ mg/cm}^2$ were obtained on aluminum ✓

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Preparation of Thick Layers of Thorium,
Uranium, Neptunium, Plutonium, and
Americium

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B006/B070

base. They were very solid up to 4 mg/cm^2 . The strength of the layer depended essentially on the initial pH of the uranyl nitrate solution (optimal $\text{pH} \approx 3$). This method has been known since 1953 (Ref.7). 4) The method of precipitation from suspensions. By this method it is possible to obtain thick layers of thorium, uranium, and transuranic metals but they are not very solid (for example, $1.2 \text{ mg/cm}^2 \text{ ThO}_2$ on aluminum).

Z. S. Gladkikh is thanked for help in the work. There are 2 figures and 7 references: 5 Soviet, 1 US, and 1 German.

SUBMITTED: April 11, 1960

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FLEROV, G.N.; POLIKANOV, S.M.; KARAMYAN, A.S. [deceased]; PASYUK, A.S.;
PARFANOVICH, D.M.; TARANTIN, N.I.; KARNAUKHOV, V.A.; DRUIN, V.A.;
VOLKOV, V.V.; SEMCHINOVA, A.M.; OGANESYAN, Yu.TS.; KHALIZEV, V.I.;
KHLEBNIKOV, G.I.; MYASOYEDOV, B.F.; GAVRILOV, K.A.

Experiments to produce element No. 102. Zhur. eksp. i teor. fiz.
38 no.1:82-94 Jan '60. (MIRA 14:9)

1. Sotrudniki Ob"edinennogo instituta yadernykh issledovaniy (for
Polikanov, Oganessian, Gavrilov). 2. Sotrudnik Instituta geokhimii
i analiticheskoy khimii AN SSSR (for Myasoyedov).
(Transuranium elements)

S/656/61/000/000/007/007
D244/D304

AUTHORS: Khlebnikov, G.I., Simanov, Yu.P., and Nemkova, O.G.

TITLE: Investigating the solid phase reactions between CaO , V_2O_5 and U_3O_8

SOURCE: Spitsyn, V.I., ed. Issledovaniya v oblasti khimii urana; sbornik statey (Moscow) 1961, 292 - 301

TEXT: The authors investigated solid phase reactions between U_3O_8 and CaO , U_3O_8 and V_2O_5 and $\text{Ca}(\text{VO}_3)_2$ and U_3O_8 . Thermal, X-ray and crystallographic analyses were the main methods used in this work. The thermal analysis was conducted by registering the cooling and heating curves (directly and differentially) on a recording ПК-52 (PK-52) pyrometer of N.S. Kurnakov with the attached low-resistance potentiometer ППТН-1 (PPTN-1). X-ray analysis was carried out with the use of X-ray tube of the БСБ (BSV) type with a copper anode. The polarizing microscope МИН-5 (MIN-5) was used for the crystallographic analysis. One part of CaCO_3 and two parts of V_2O_5 were

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Investigating the solid phase ...

taken for studying the interaction between CaO and V_2O_5 . Thermal analysis of this mixture indicated that between 595° and 603°C $\text{Ca}(\text{VO}_3)_2$ is formed, which forms a eutectic mixture with V_2O_5 melting at 618°C . The formation of $\text{Ca}(\text{VO}_3)_2$ is confirmed by the X-ray and crystallographic analyses. The same result was obtained by heating 1 : 1 mixture of CaCO_3 and V_2O_5 . Heating of the 2 : 1 mixture gave the formation of $\text{Ca}(\text{VO}_3)_2$ at 611°C and also $\text{Ca}_2\text{V}_2\text{O}_7$ at 688°C , which melts at $972 - 973^\circ\text{C}$. The interaction of U_3O_8 with $\text{Ca}(\text{VO}_3)_2$ and $\text{Ca}_2\text{V}_2\text{O}_7$ was studied in a current of air. $\text{Ca}(\text{VO}_3)_2$ and U_3O_8 investigated were mixed in the ratio of 3 : 2 and 3 : 1 respectively (mixture I and III). Also 3 parts of CaV_2O_5 were heated with 1 part of U_3O_8 (mixture II). The heating was continued up to 1100°C . The results obtained indicate that a complex compound is formed from $\text{Ca}(\text{VO}_3)_2$ and U_3O_8 having composition III. The authors postulate

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Investigating the solid phase ...

that the formula of the compound is $\text{CaUO}_2 \cdot \text{V}_2\text{O}_7$. The heating of mixture II gives a reaction at $850 - 863^\circ\text{C}$ corresponding to the formation of new compounds different from the reactants and also CaUO_4 , V_2O_5 and $\text{CaUO}_2\text{V}_2\text{O}_7$. On the basis of the results obtained the authors conclude that at temperatures up to 1100°C CaV_2O_7 does not react with V_2O_5 and, also, that CaV_2O_7 forms with U_3O_8 in air $\text{CaUO}_2\text{V}_2\text{O}_7$ which does not react with excess of U_3O_8 . The authors give for the first time interplanar distances for the crystalline lattices of $\text{Ca}(\text{VO}_3)_2$, $\text{Ca}_2\text{V}_2\text{O}_7$ and $\text{CaUO}_2\text{V}_2\text{O}_7$. There are 7 figures, 6 tables, and 8 references: 3 Soviet-bloc and 5 non-Soviet-bloc. The reference to the English-language publication reads as follows: J. Mellor, A compr. treat. on inorg. and theor. chem., 9, 12, 1933.

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23878

S/186/61/003/001/011/020

A051/A129

21.3100

AUTHORS: Gavrilov, K.A., Myasoyedov, B.F., Khlebnikov, G.I.

TITLE: The production of targets from plutonium for the irradiation on a cyclotron with multi-charge ions

PERIODICAL: Radiokhimiya, v 3, no 1, 1961, 62-67

TEXT: The article deals with a description of the production of targets made from specially purified samples of plutonium, which are used for producing the 102nd element. The authors studied the possibility of producing pure plutonium by eliminating ultra-small quantities of Fe, Tl, Hg, Bi, Pb, Pt. They were able to obtain Pu²³⁹, Pu²⁴⁰, and Pu²⁴² isotopes, containing $Pb \leq 0.01 \%$ to 100 $\%$ of Pu and other interfering elements below the sensitivity line of the activation method. Finally, they prepared targets, which were used for the production of the 102nd element from purified samples of plutonium by the electrolytic method and the method of evaporation with

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The production of targets from plutonium ...

²³⁸⁷⁸
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A051/A129

tetraethyleneglycol. Admixtures, such as Tl, Hg, Bi, Pb, Pt, are thought to be rather dangerous in the target material, even in small quantities, since during the interaction of multi-charge ions with elements they form isotopes emitting α -particles with an energy close to the energy of the α -particles of the 102nd element and a great number of α -particles of other energy levels creating a rather high background impeding the viewing of the photo-plates. The thickness of the plutonium layer on the targets was about $200 \text{ } \gamma/\text{cm}^2$. The quantity of the stabilizing material was not to exceed about $200 \text{ } \gamma/\text{cm}^2$ calculated on the copper equivalent. The administration of the plutonium isotopes had to be carried out on very thin linings to avoid a decrease in the energy of the bombarding particles, since the formation cross-section of the trans-uranium elements depends to a large extent on the energy of these particles. The work was based on the fact that plutonium (IV) is well extracted from a 5 n nitrate solution with diethyl ether, whereas the main interfering elements under these conditions barely pass into the ether phase (Ref 3). The second purification stage of plutonium was based on the formation of Pt, Bi, Hg, Tl³⁺ stable anion complexes and their sorption by the anionite within a wide range of HCl concentrations (Ref 4). The ex-

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A051/4129

The production of targets from plutonium ...

periments showed that the NO_3^- ions even at low concentrations ($\sim 0.01 \text{ M}$) extremely hinder (~ 100 times) the purification of plutonium from lead and bismuth on the ion-exchanging column. It is assumed that when heating tetravalent plutonium in 11 n HCl its partial reduction to the tri-valent state takes place. The work carried out resulted in the production of plutonium samples as given above. The targets were produced by electrolysis or by simple application of active solutions, using organic additives. In the case of electrolysis the method of plutonium formation from formate was chosen (Ref 5,6) ensuring quantitative application and production of stable layers. The authors investigated the undesirable deposition of platinum, i.e., an interfering element in the production of the PuO_2 element, during the electrolytic process, depending on different current densities, electrolysis time, with respect to the nature and concentration of added ions of mineral acids and alkali. The experiments showed that during electrolysis even from 0.1 n solutions of HNO_3 and KOH the amount of platinum deposited on the cathode is about 1.5-2.0%, which is inadmissible. Various electrodes were tested for use, such as rhodium, lead, niobium, molybdenum, tantalum, nickel, molybdenum, palladium and chromium cathodes. The use of Cr, Ni, Zn,

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The production of targets from plutonium ...

Mo, Pd and W, etc. both passive and non-passive type anodes proved unsuitable due to their dissolution during the electrolytic process. The only suitable electrodes found were made of rhodium or graphite. A study was made of the depositing process of neptunium depending on the concentration of the electrolyte, current density, time and type of lining (Al, V, Ni, Nb). The authors assume that under the selected conditions of electrolysis plutonium (IV) and (VI) are those deposited mainly on the cathode. Fig 2 is a graph of the relationship of the plutonium yield on the target to the amount of potassium bromate. The graphs (Figs 2-4) show that the change of the pH (from 3 to 7) has no significant effect on the electrolytic depositing process of plutonium. The graphite anode was also found to be successful in addition to the rhodium one. The authors point out that the advantage of the evaporation method with tetraethyleneglycol for producing targets lies in the fact that it eliminates the entering of impurities into the target, which can occur during electrolysis due to anode dissolution. It also gives good layers on small areas. There are 2 tables, 4 figures and 6 references: 4 Soviet-bloc, 2 non-Soviet-bloc.

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